



US009075373B2

(12) **United States Patent**
Hirata

(10) **Patent No.:** **US 9,075,373 B2**
(45) **Date of Patent:** **Jul. 7, 2015**

(54) **DATA PROCESSING DEVICE, IMAGE FORMING DEVICE AND PROGRAM FOR INSTRUCTING PRINTING WITH DESIGNATION OF COPY COUNT**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 848 days.

(21) Appl. No.: **13/276,437**

(22) Filed: **Oct. 19, 2011**

(65) **Prior Publication Data**

US 2012/0099138 A1 Apr. 26, 2012

(30) **Foreign Application Priority Data**

Oct. 21, 2010 (JP) 2010-236531

(51) **Int. Cl.**
G03G 15/00 (2006.01)

(52) **U.S. Cl.**
CPC .. **G03G 15/5087** (2013.01); **G03G 2215/00109** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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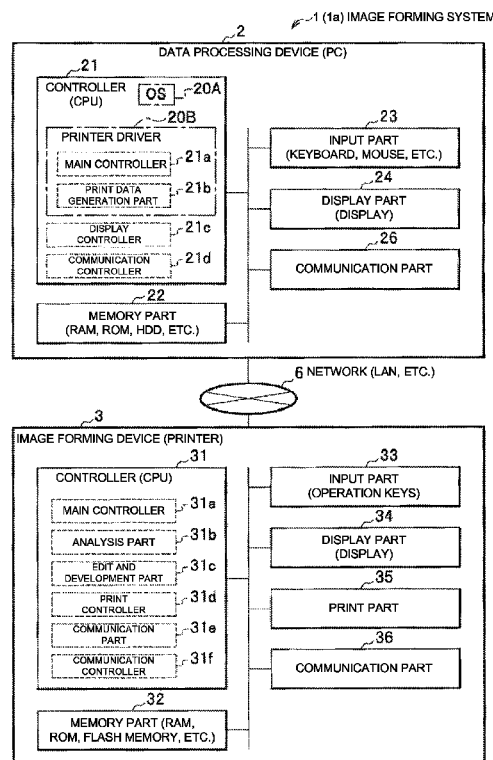
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(57) **ABSTRACT**

A data processing device transmits a control command and print data to an image forming device. When a main controller causes a communication controller to transmit the print data to the image forming device, the main controller causes a memory part to save a setting data at least until the main controller receives a notification of print process completion, and causes a display part to display, for example, a copy count change screen that displays settings of the print data that is changeable by the input part.

15 Claims, 33 Drawing Sheets



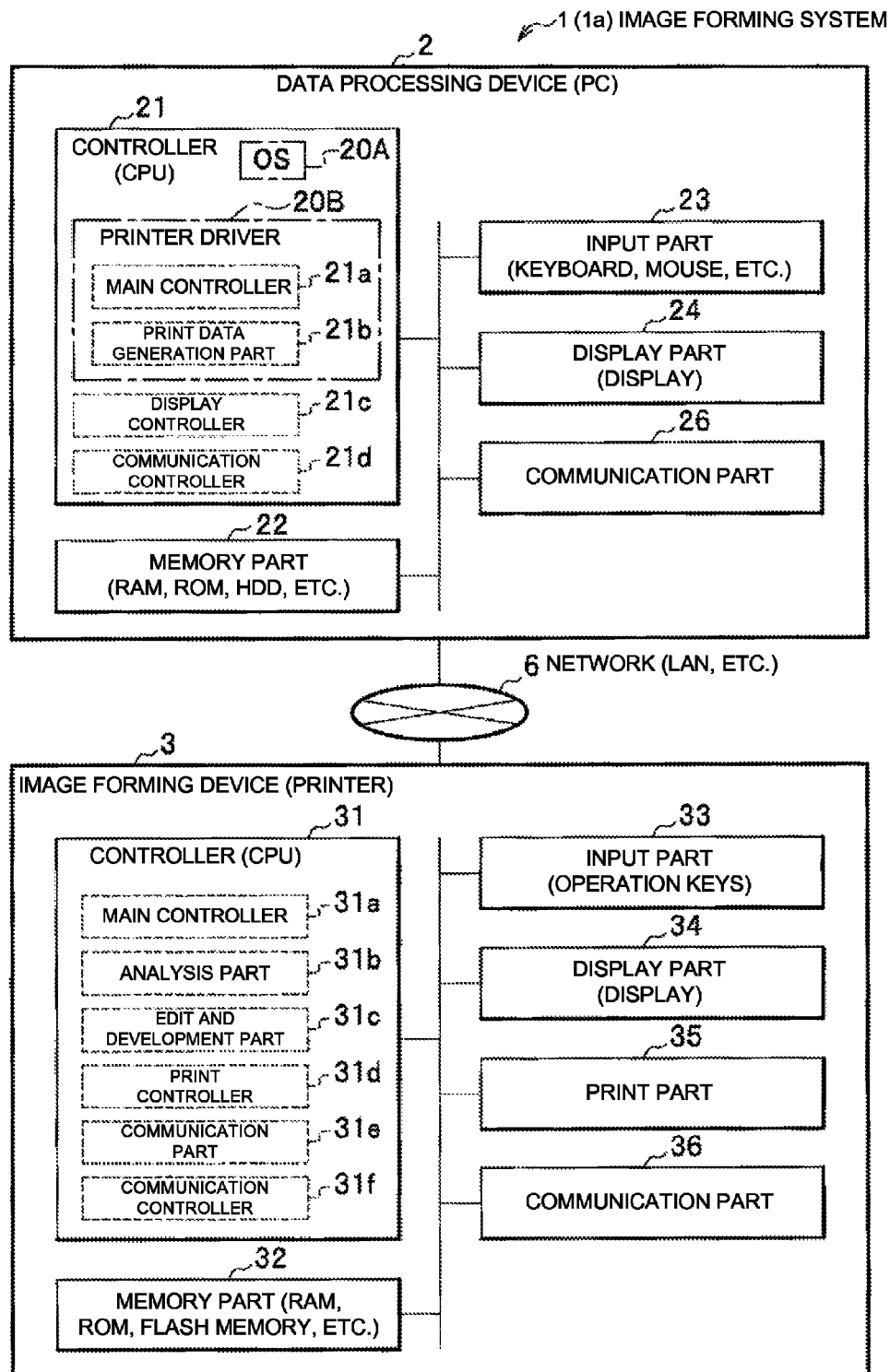


Fig. 1

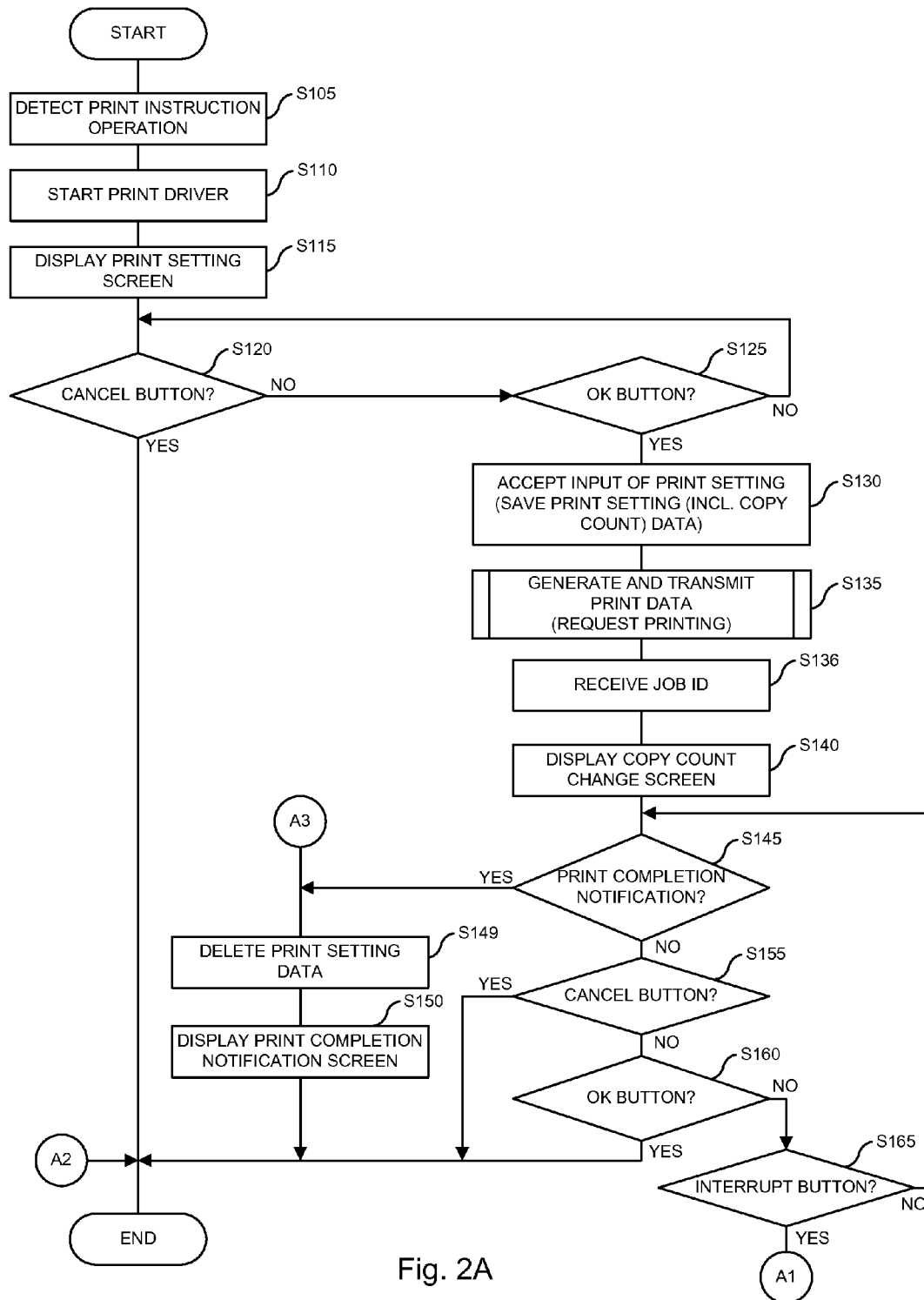


Fig. 2A

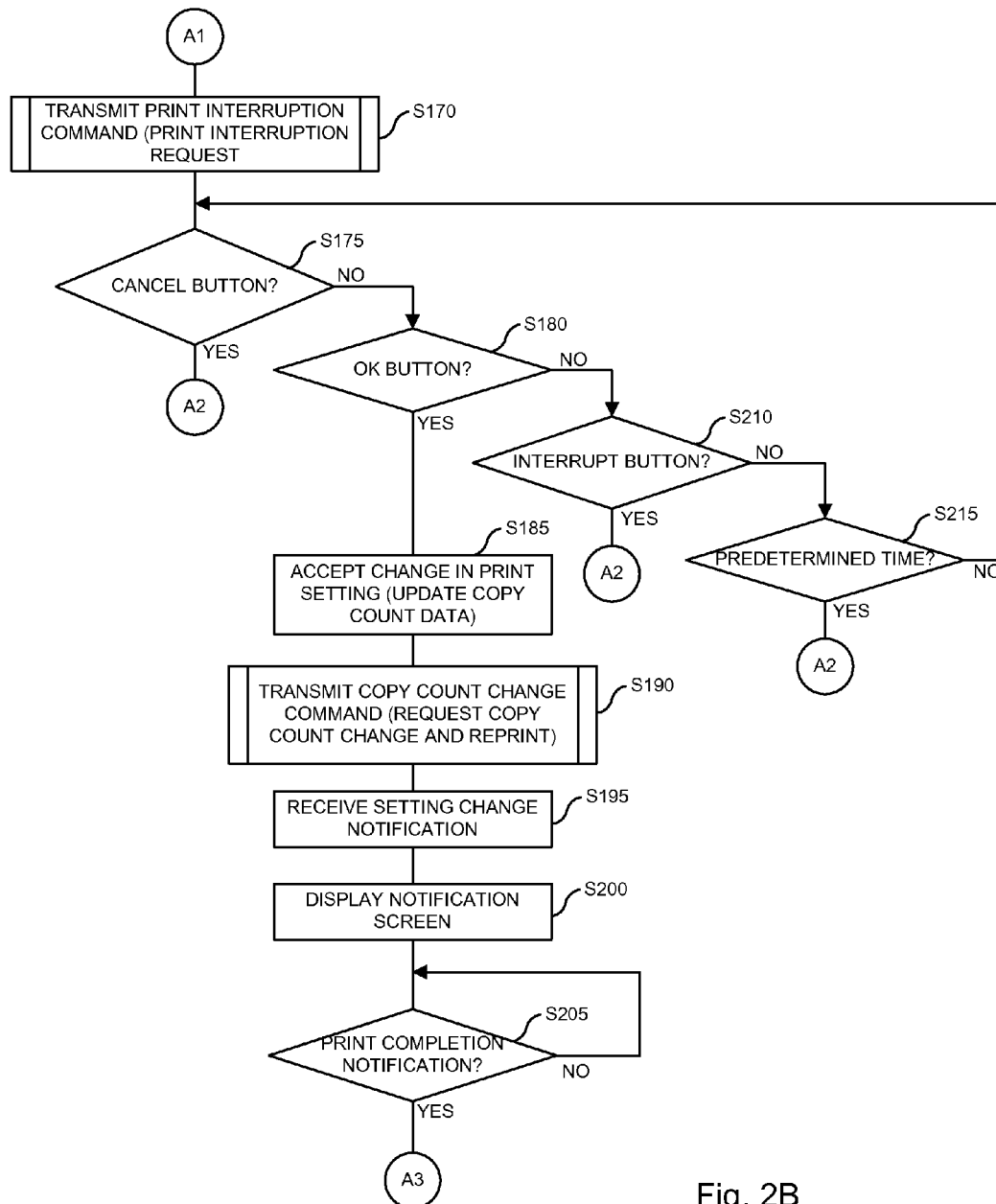


Fig. 2B

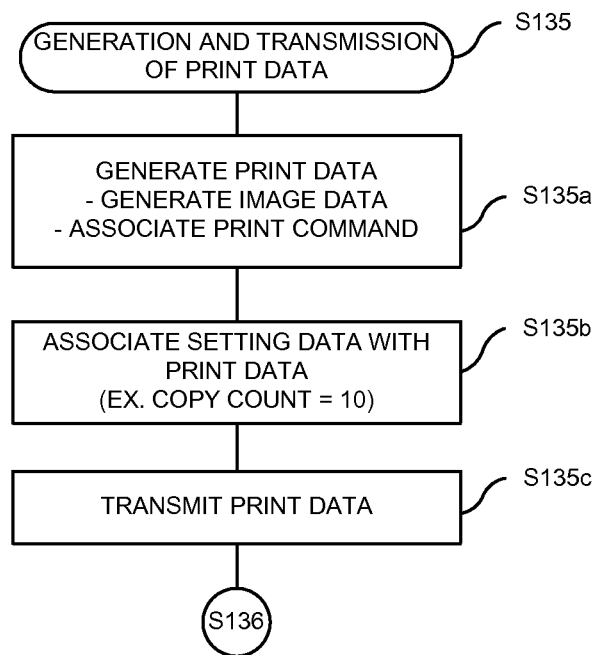


Fig. 3

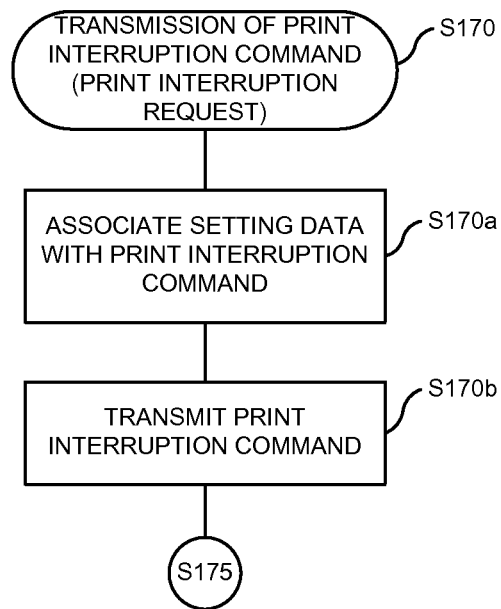


Fig. 4

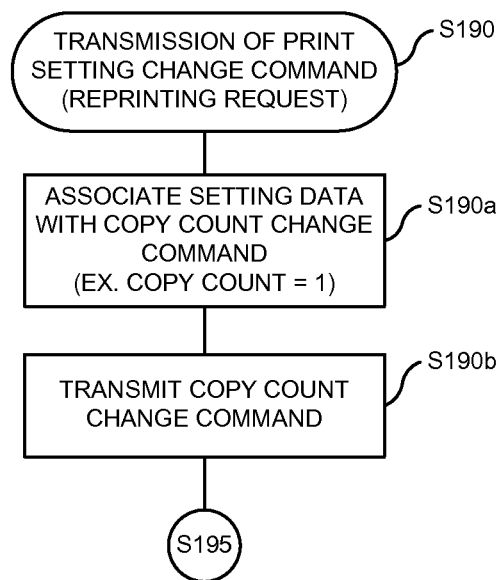


Fig. 5

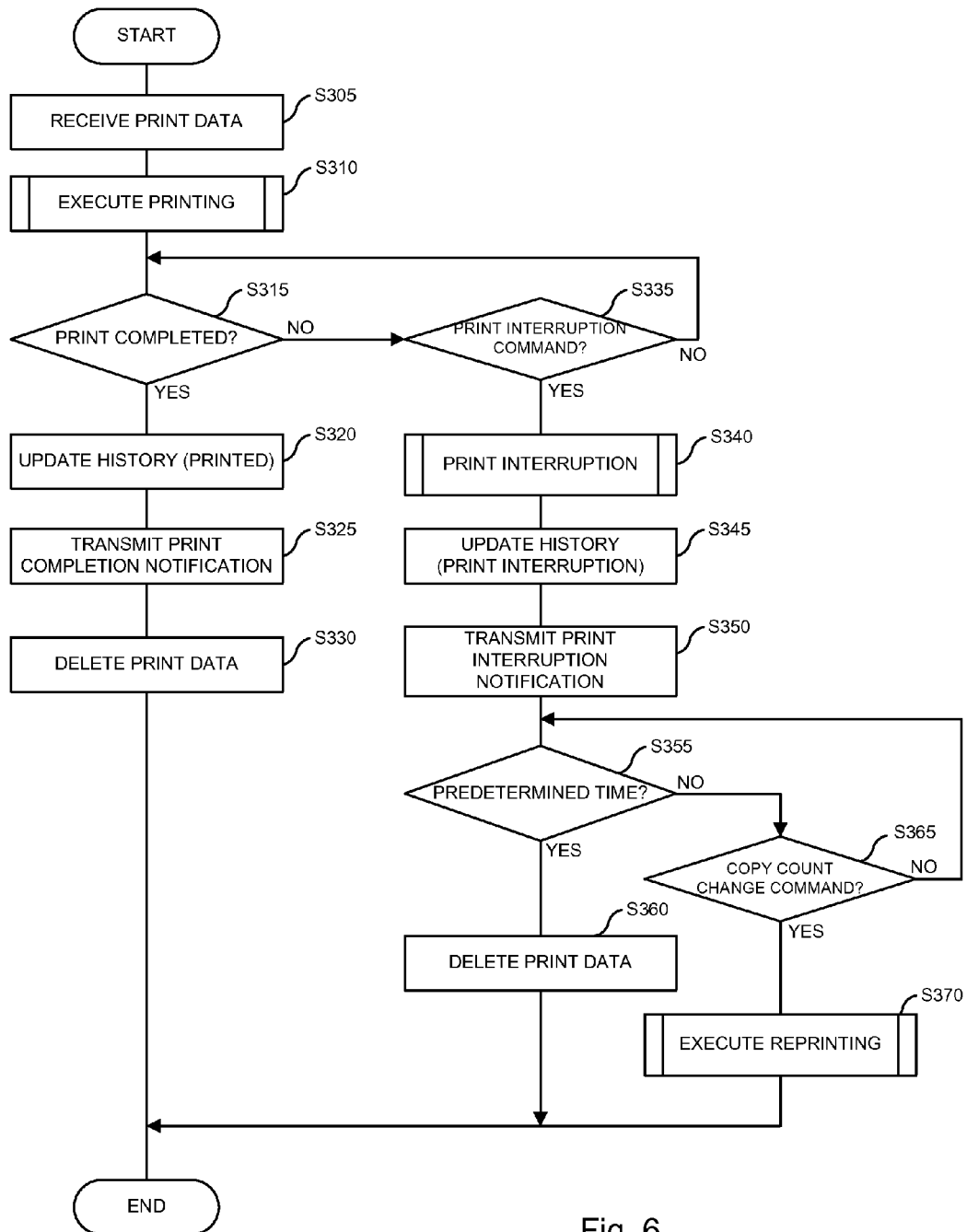


Fig. 6

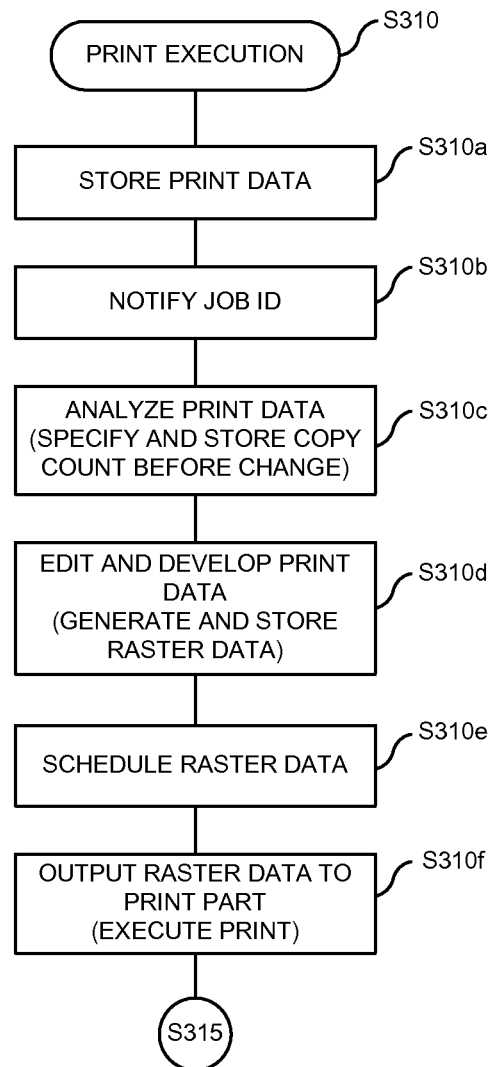


Fig. 7

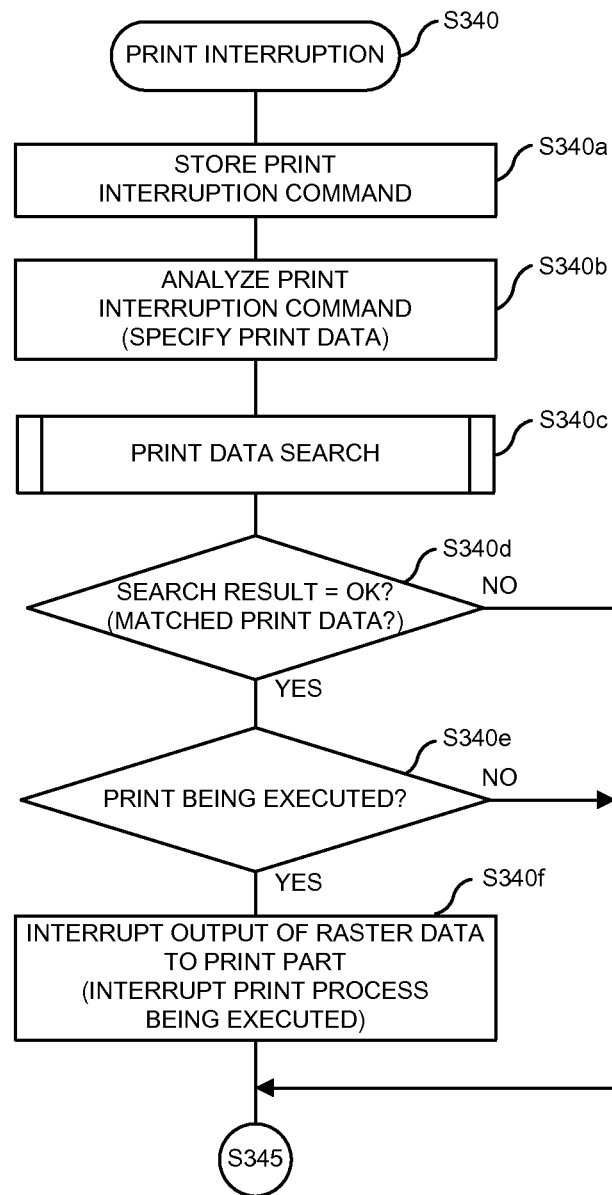


Fig. 8

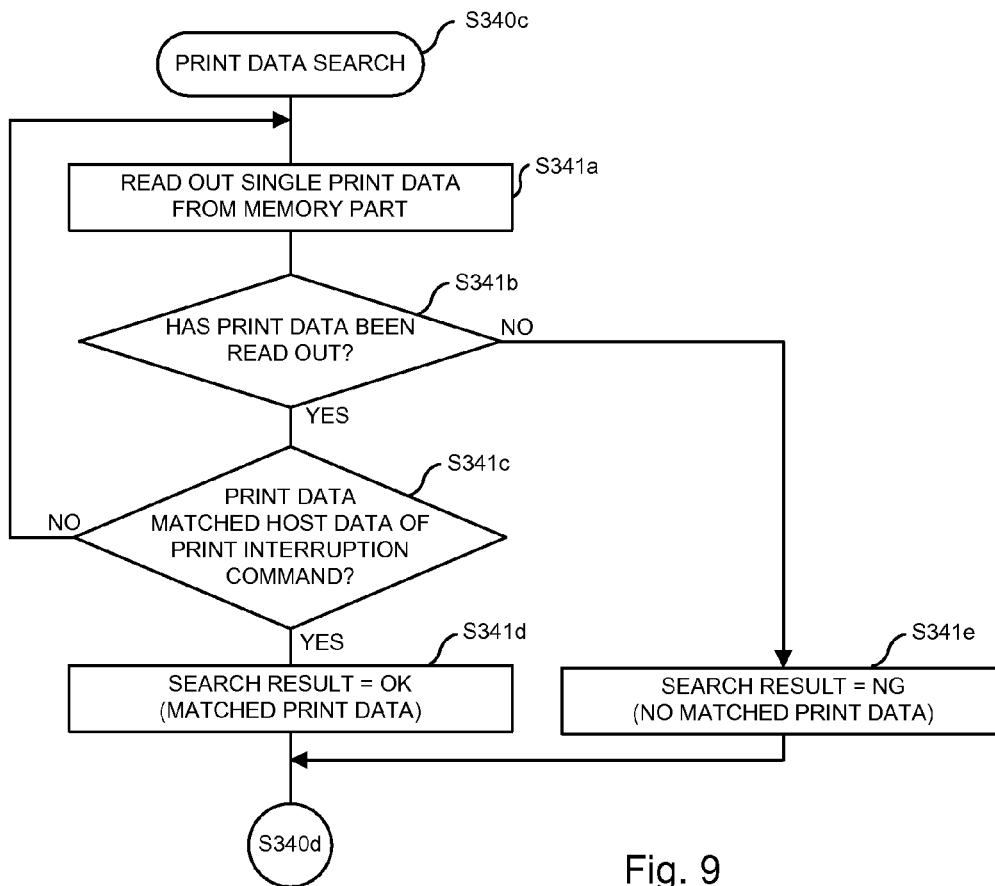


Fig. 9

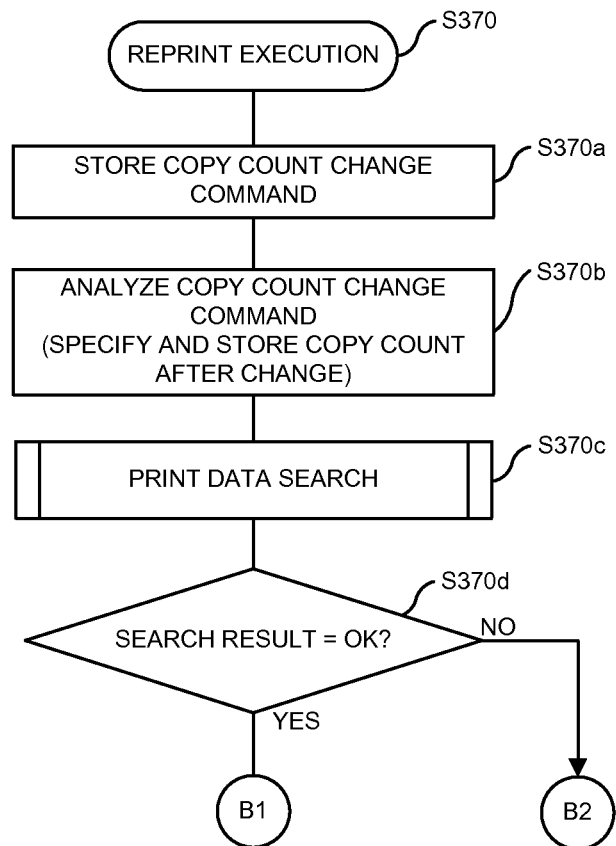


Fig. 10A

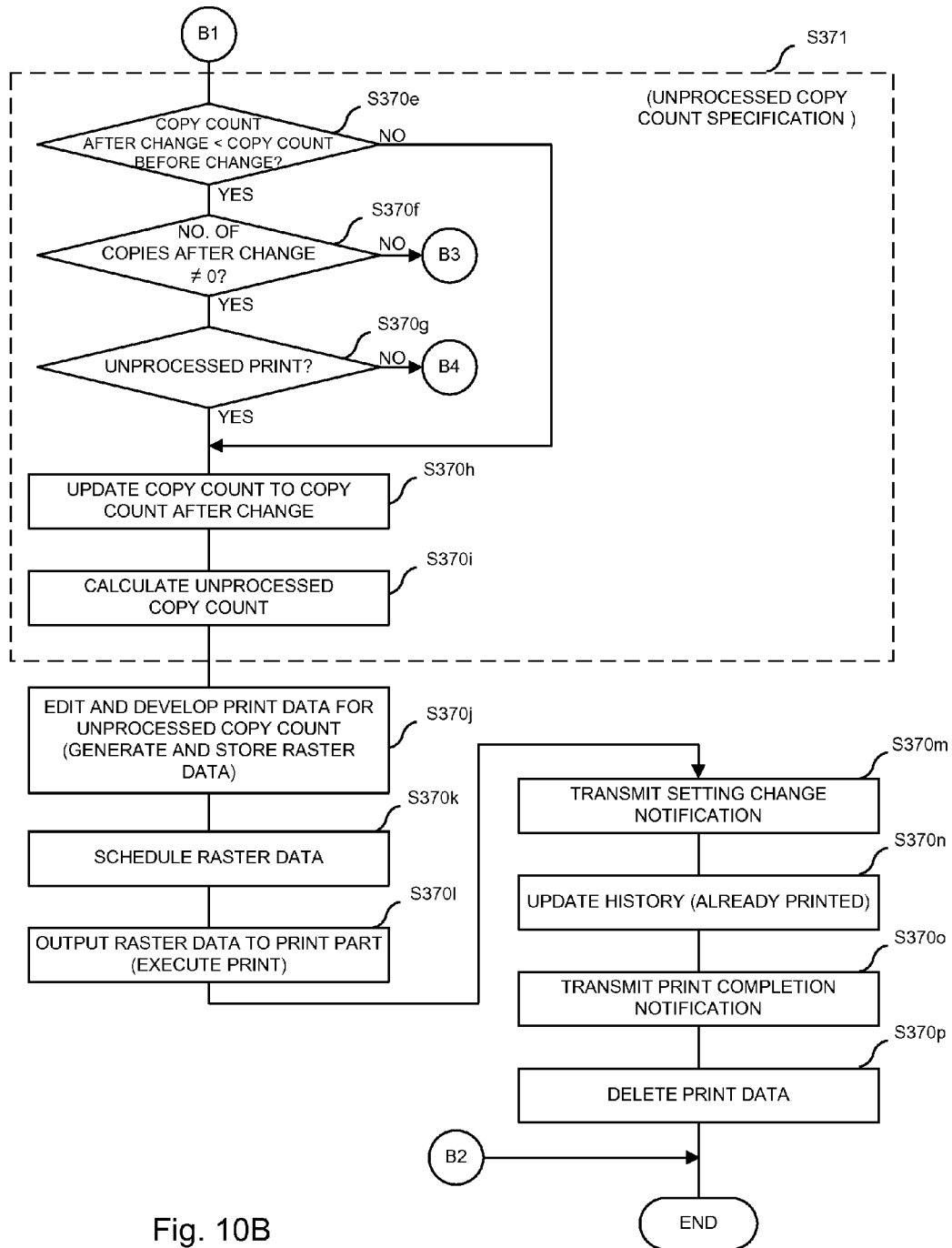


Fig. 10B

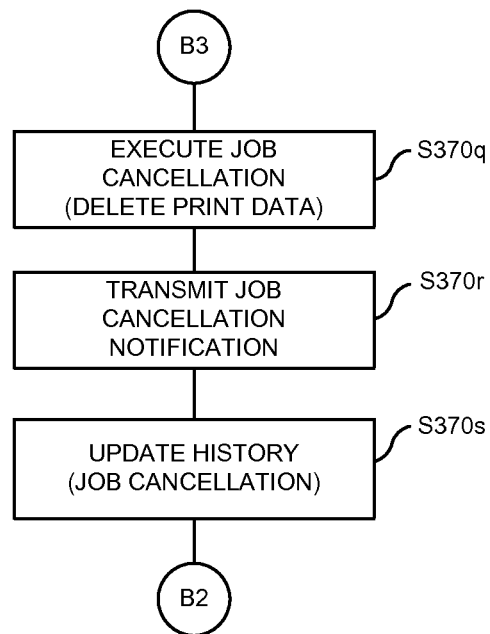


Fig. 10C

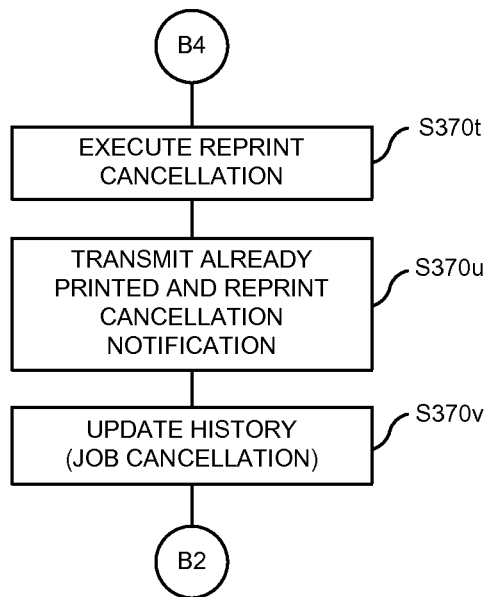


Fig. 10D

101 PRINT SETTING SCREEN

The dialog box is titled "PRINT" and has a close button (X) in the top right corner. It contains three main sections:

- PRINTER**: A section with a "NAME" label, a text box containing "PRINTER1", a dropdown arrow, and a "PROPERTY" button.
- PRINT RANGE**: A section with three radio button options: "ALL" (selected), "CURRENT PAGE", and "PAGES". The "PAGES" option is followed by an empty text box.
- COPY COUNT**: A section with a "COPY COUNT" label, a "NO." label, a text box, and a vertical spinner control. A squiggly line labeled "101c" points to the spinner.

At the bottom right, there are two buttons: "OK" (labeled "101a" with a squiggly line) and "CANCEL" (labeled "101b" with a squiggly line).

Fig. 11

COPY COUNT CHANGE
111 SCREEN

CHANGE COPY COUNT

BEFORE

NO. OF PAGES: 10

COPY COUNT: 10

TOTAL: 100

AFTER

NO. OF PAGES: 10

COPY COUNT:

TOTAL: 100

111a

111b

111c

111d

Fig. 12

Fig. 13A

(COPY COUNT AFTER
CHANGE < COPY COUNT
BEFORE CHANGE)

111

CHANGE COPY COUNT

BEFORE	
NO. OF PAGES:	10
COPY COUNT:	10
TOTAL:	100

AFTER	
NO. OF PAGES:	10
COPY COUNT:	<input type="text" value="1"/>
TOTAL:	10


111d

111a 111b 111c

Fig. 13B

112 NOTIFICATION SCREEN

CHANGE COPY COUNT


 COPY COUNT HAS BEEN CHANGED. PRINTING WILL BE RESUMED.

OK

Fig. 13C

113 NOTIFICATION SCREEN

CHANGE COPY COUNT

 SET COPY COUNT HAS ALREADY BEEN PRINTED. PRINTING WILL BE CANCELLED.

OK

Fig. 14A

(COPY COUNT
AFTER CHANGE = 0) COPY COUNT CHANGE
SCREEN

CHANGE COPY COUNT

BEFORE

NO. OF PAGES:	10
COPY COUNT:	10
TOTAL:	100

AFTER

NO. OF PAGES:	10
COPY COUNT:	<input type="text" value="0"/> 111d
TOTAL:	0

INTERRUPT 111a OK 111b CANCEL 111c

Fig. 14B

NOTIFICATION
SCREEN

CHANGE COPY COUNT

i PRINTING IS CANCELLED.

OK

Fig. 15A

(COPY COUNT AFTER
CHANGE > COPY COUNT
BEFORE CHANGE)

COPY COUNT CHANGE
SCREEN

CHANGE COPY COUNT

BEFORE

NO. OF PAGES:	10
COPY COUNT:	10
TOTAL:	100

AFTER

NO. OF PAGES:	10
COPY COUNT:	<input type="text" value="20"/>
TOTAL:	200

111d


111a 111b 111c

111

Fig. 15B

NOTIFICATION
SCREEN

CHANGE COPY COUNT

 COPY COUNT HAS BEEN
CHANGED. PRINTING WILL
BE RESUMED.

OK

115

201 PRINT DATA ASSOCIATION
SETTING DATA

SETTING ITEM	VALUE
JOB TYPE	PRINT JOB
COPY COUNT	10
COMPUTER NAME	PC1
IP ADDRESS	123.123.123.123
PORT NAME	LPR

Fig. 16

PRINT INTERRUPTION COMMAND
ASSOCIATION SETTING DATA

202

SETTING ITEM	VALUE
JOB TYPE	COMMAND
JOB ID	aaaa
COMPUTER NAME	PC1
IP ADDRESS	123.123.123.123
PORT NAME	LPR

Fig. 17

203 COPY COUNT CHANGE COMMAND
ASSOCIATION SETTING DATA

SETTING ITEM	VALUE
JOB TYPE	COMMAND
JOB ID	aaaa
COPY COUNT	1
COMPUTER NAME	PC1
IP ADDRESS	123.123.123.123
PORT NAME	LPR

Fig. 18

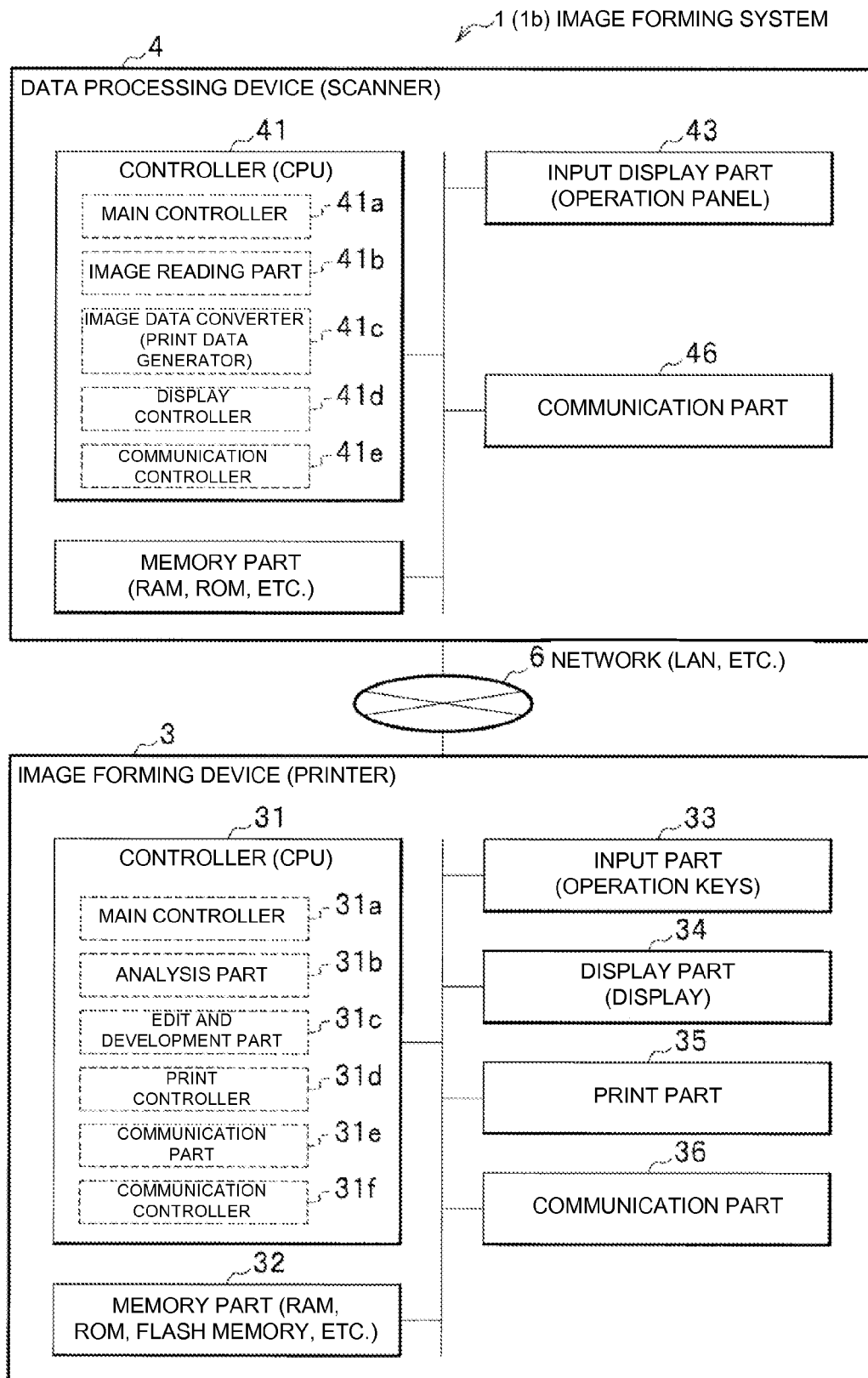


Fig. 19

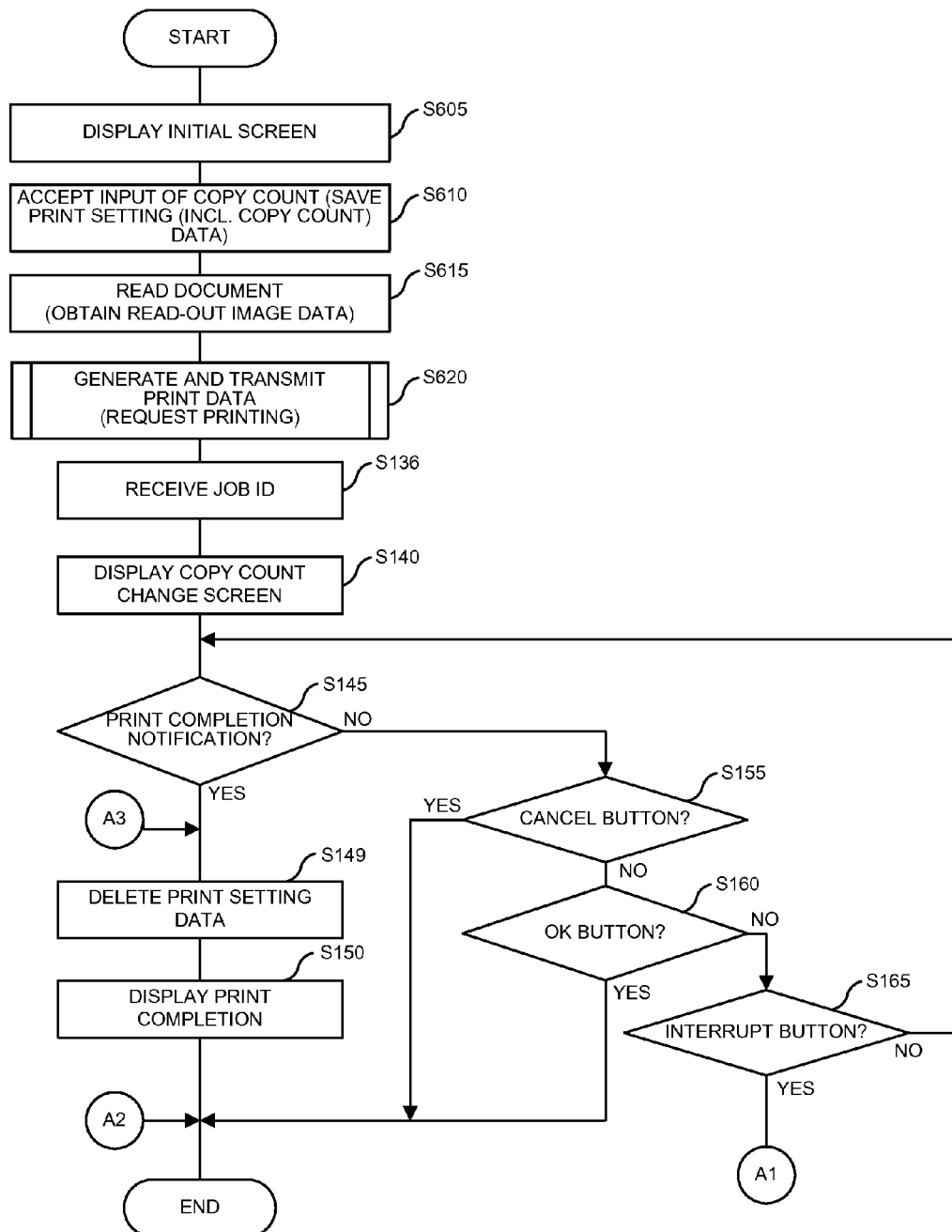


Fig. 20

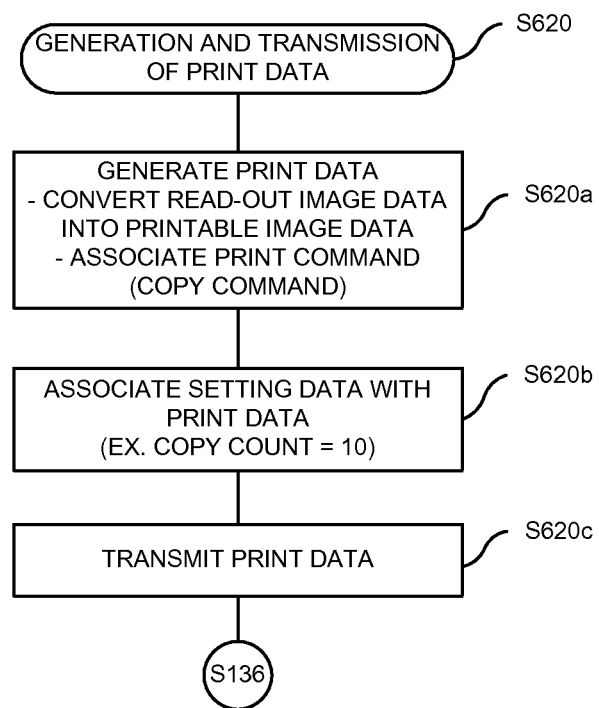


Fig. 21

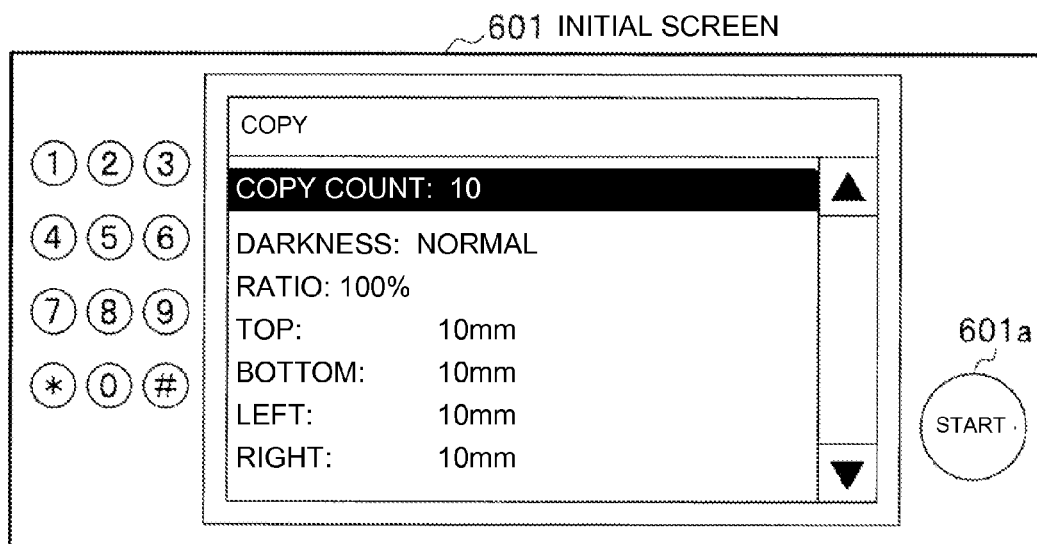


Fig. 22

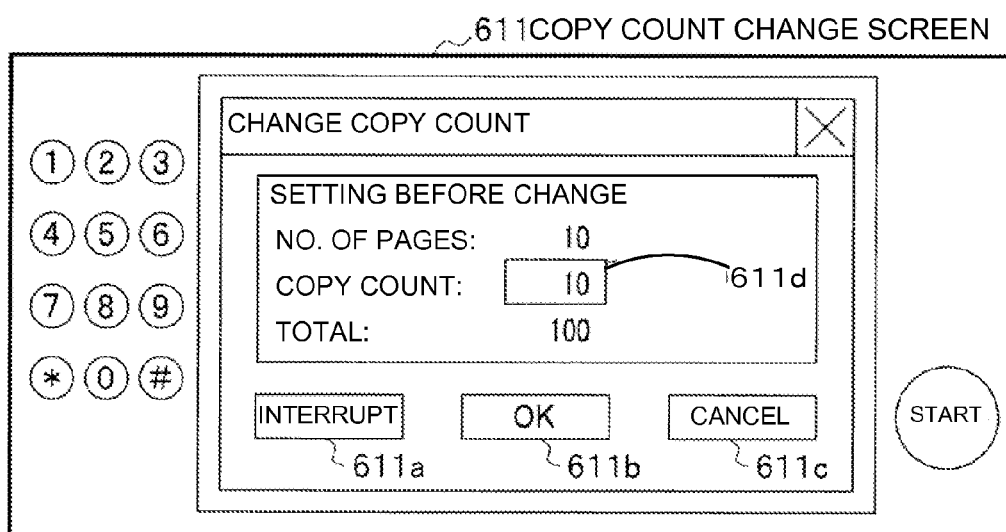


Fig. 23

Fig. 24A

(COPY COUNT AFTER CHANGE <
COPY COUNT BEFORE CHANGE)

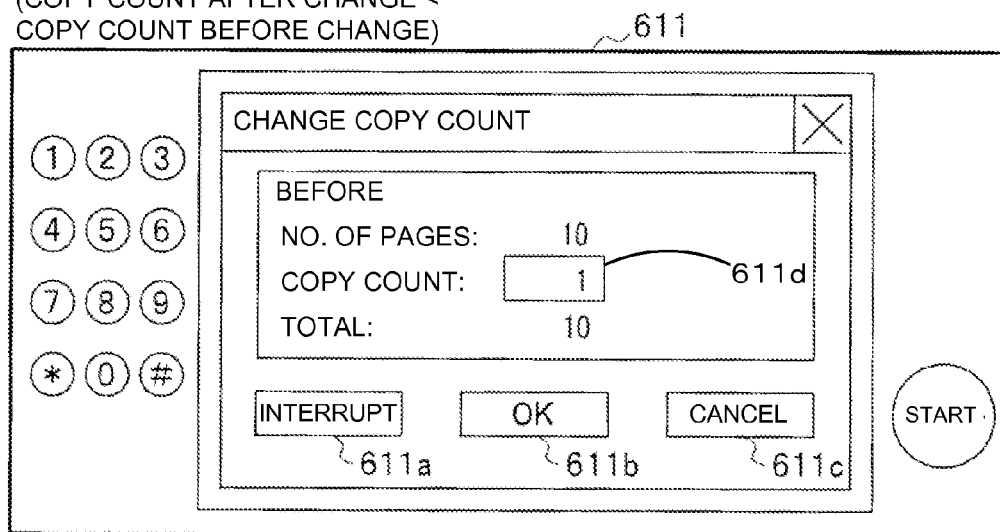


Fig. 24B

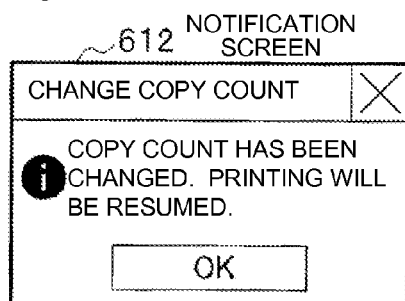


Fig. 24C

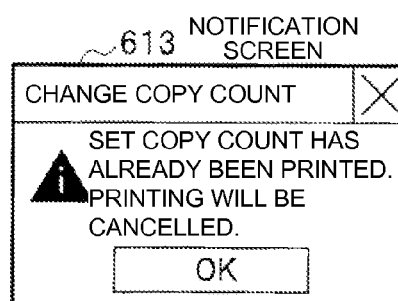


Fig. 25A

(COPY COUNT
AFTER CHANGE = 0)

COPY COUNT

611 CHANGE SCREEN

CHANGE COPY COUNT

BEFORE

NO. OF PAGES: 10

COPY COUNT: 0 611d

TOTAL: 0

INTERRUPT 611a OK 611b CANCEL 611c

START

Fig. 25B

NOTIFICATION
SCREEN

CHANGE COPY COUNT

i PRINTING IS CANCELLED.

OK

Fig. 26A

(COPY COUNT AFTER CHANGE >
COPY COUNT BEFORE CHANGE)

COPY COUNT

611 CHANGE SCREEN

The screen displays a numeric keypad on the left with buttons for digits 1-9, 0, *, and #. The main area contains a window titled 'CHANGE COPY COUNT' with a close button (X). Inside this window is a sub-window titled 'BEFORE' showing 'NO. OF PAGES: 10', 'COPY COUNT: 20' (with a text input field), and 'TOTAL: 200'. A curved arrow points from the 'COPY COUNT' value to a label '611d'. Below the sub-window are three buttons: 'INTERRUPT' (labeled 611a), 'OK' (labeled 611b), and 'CANCEL' (labeled 611c). To the right of the main window is a circular 'START' button.

Fig. 26B

NOTIFICATION
SCREEN

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The screen displays a window titled 'CHANGE COPY COUNT' with a close button (X). Inside the window, an information icon (i) is followed by the text: 'COPY COUNT HAS BEEN CHANGED. PRINTING WILL BE RESUMED.' Below this text is an 'OK' button.

701 PRINT DATA ASSOCIATION
SETTING DATA

SETTING ITEM	VALUE
JOB TYPE	PRINT JOB
COPY COUNT	10
SCANNER NAME	Scanner1
IP ADDRESS	123.123.123.123
PORT NAME	TCP/IP

Fig. 27

702 PRINT INTERRUPTION COMMAND
ASSOCIATION SETTING DATA

SETTING ITEM	VALUE
JOB TYPE	COMMAND
JOB ID	aaaa
SCANNER NAME	Scanner1
IP ADDRESS	123.123.123.123
PORT NAME	TCP/IP

Fig. 28

COPY COUNT CHANGE COMMAND
ASSOCIATION SETTING DATA

703

SETTING ITEM	VALUE
JOB TYPE	COMMAND
JOB ID	aaaa
COPY COUNT	1
SCANNER NAME	Scanner1
IP ADDRESS	123.123.123.123
PORT NAME	TCP/IP

Fig. 29

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DATA PROCESSING DEVICE, IMAGE FORMING DEVICE AND PROGRAM FOR INSTRUCTING PRINTING WITH DESIGNATION OF COPY COUNT

CROSS REFERENCE TO RELATED APPLICATION

The present application is related to, claims priority from and incorporates by reference Japanese patent application No. 2010-236531, filed on Oct. 21, 2010.

TECHNICAL FIELD

The present application relates to a data processing device that instructs printing with a designation of a copy count, an image forming device to be used in conjunction with the data processing device, and a program that realizes the data processing device. The term “copy count” in the specification means a number of copies to be printed as well as a number of copies have already been printed.

BACKGROUND

Data processing devices have been widely used that instruct printing to an image forming device with a designation of a copy count. The data processing device is configured as a personal computer (PC), for example. The image forming device is configured as a printer of MFP, for example. The “MFP” stands for a multi function printer, which is a printer with a facsimile function, a scanner function, a copy function and the like.

When the data processing device instructs printing of a document that the user created by application software, for example, the data processing device generates print data that includes a “print command (control command for instructing the image forming device to execute a print process),” “print instruction image data (drawing contents)” and the like and transmits the print data to the image forming device with setting data, such as “sheet size,” “number of pages,” “copy count,” “file name,” “user name (computer name)” and the like. Below, the print data with the setting data is also explained simply as “print data.”

When the image forming device receives the print data from the data processing device, the image forming device once stores the received print data in a memory part. Then, the image forming device retrieves the print data stored in the memory part, analyzes the retrieved print data, and specifies the copy count and the like. In addition, the image forming device edits and develops (rasterizes) the print data and generates raster data, in which the drawing contents are dot-patterned, by editing and developing (rasterizing) the print data. Then, the image forming device execute a print process based the generated raster data. The term “editing” means a process to convert the drawing contents into an intermediate language. In addition, the term “developing (rasterizing)” means a process for converting the drawing contents that have been converted into the intermediate language, into a dot pattern.

As such an image forming device, there is a device that stores the print data received from the data processing device in the memory part even after the completion of the printing and that performs reprinting based on the print data stored in the memory part when the reprinting of the print data is instructed from the data processing device for a reason, such as the designated copy count being not enough (see Japanese Laid-Open Patent Application No. H8-30413).

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However, as described below, the conventional data processing device and image forming devices have a problem that, if the designated copy count is too large, an extreme burden is added to the user to change the copy count.

For example, there is a case where the user mistakenly instructs the printing to the data processing device with the large copy count. In this case, the user controls the data processing device and cancels the print instruction once. Then, the user changes the print setting and instructs the reprinting.

The conventional data processing device and the conventional image forming device delete the print data when the print instruction is cancelled. Therefore, if the print instruction is cancelled, the user cannot reference the cancelled print data. For instructing the reprinting with different print settings, the user need to determine an appropriate setting for each print setting based on his memory and manually input all of the print settings again. This operation is burdensome and time consuming because the user needs to memorize the past print settings and to perform manual operation.

In addition, before the image forming device accepts a cancellation instruction for the print instruction, the user needs to count the copy count (or copy count) that the image forming device has printed, to determine whether or not there is any insufficient copy count. If there is insufficient copy count, the user needs to specify the insufficient copy count and change the print setting. Because this operation is also performed manually, it is burdensome and time consuming. Therefore, there is a problem with the conventional data processing device and image forming devices that, if the designated copy count is too large, an extreme burden is added to the user to change the copy count.

To solve the above-described problems, the present application has an object to provide a data processing device that eases the user’s burden for changing the copy count when the designated copy count is too large and a program to realize the data processing device.

Furthermore, the present application has another object to provide an image forming device that is used in conjunction with the data processing device and that eases the user’s burden for changing the copy count when the designated copy count is too large.

SUMMARY

A data processing device that transmits a control command and print data to an image forming device includes: a communication part that executes communication with the image forming device; an input part to which an instruction for the image forming device is inputted; a display part that displays images; a print data generator that generates the control command and the print data; a communication controller that controls the communication by the communication part; and a memory part that stores data including the print data; and a main controller that controls operation of the communication part, the input part, the display part, the print data generator, the communication controller and the memory part. When the main controller causes the print data generator to generate the print data and to associate setting data that includes copy count data that designates a copy count of the print data with the print data, and when the main controller causes the communication controller to transmit the print data, with which the setting data is associated, to the image forming device, the main controller causes the memory part to save the setting data at least until the main controller receives a notification, which indicates completion of a print process of the print data, from the image forming device, and the main controller

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causes the display part to display a screen, as a copy count change screen for instructing a change in the copy count, that displays settings of the print data that is changeable by the input part, the settings of the print data including the copy count designated by the copy count data.

According to the device disclosed in the application, it is possible to provide processing device and image forming devices that, if the designated copy count is too large, is able to ease the burden of the user to change the copy count. In another view, it is possible to provide an image forming device, which is used in conjunction with a data processing device, easing the burden of the user to change the copy count. Further, in another view, it is possible to provide a computer program executing the functions of the above devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a configuration of a data processing device and an image forming device according to a first embodiment.

FIG. 2A is a first flow diagram illustrating an entire operation of the data processing device according to the first embodiment.

FIG. 2B is a second flow diagram illustrating the entire operation of the data processing device according to the first embodiment.

FIG. 3 is a flow diagram illustrating an operation of the data processing device according to the first embodiment at the time of generating and transmitting print data.

FIG. 4 is a flow diagram illustrating an operation of the data processing device according to the first embodiment at the time of transmitting a print interruption command.

FIG. 5 is a flow diagram illustrating an operation of the data processing device according to the first embodiment at the time of transmitting a copy count changing command.

FIG. 6 is a flow diagram illustrating an entire operation of the image forming device according to the first embodiment.

FIG. 7 is a flow diagram illustrating an operation of the image forming device according to the first embodiment at the time of executing the printing.

FIG. 8 is a flow diagram illustrating an operation of the image forming device according to the first embodiment at the time of interrupting the printing.

FIG. 9 is a flow diagram illustrating an operation of the image forming device according to the first embodiment at the time of searching the print data.

FIG. 10A is a first flow diagram illustrating an operation of the image forming device according to the first embodiment at the time of executing the reprinting.

FIG. 10B is a second flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of executing the reprinting.

FIG. 10C is a third flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of executing the reprinting.

FIG. 10D is a fourth flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of executing the reprinting.

FIG. 11 is a first diagram illustrating an example of a display screen of the data processing device according to the first embodiment.

FIG. 12 is a second diagram illustrating an example of the display screen of the data processing device according to the first embodiment.

FIGS. 13A to 13C are third diagrams illustrating examples of the display screen of the data processing device according to the first embodiment.

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FIGS. 14A and 14B are fourth diagrams illustrating examples of the display screen of the data processing device according to the first embodiment.

FIGS. 15A and 15B are fifth diagrams illustrating examples of the display screen of the data processing device according to the first embodiment.

FIG. 16 is a first diagram illustrating a configuration example of setting data used in the first embodiment.

FIG. 17 is a second diagram illustrating the configuration example of the setting data used in the first embodiment.

FIG. 18 is a third diagram illustrating the configuration example of the setting data used in the first embodiment.

FIG. 19 illustrates a configuration of a data processing device and an image forming device according to a second embodiment.

FIG. 20 is a flow diagram illustrating an entire operation of the data processing device according to the second embodiment.

FIG. 21 is a flow diagram illustrating an operation of the data processing device according to the second embodiment at the time of generating and transmitting print data.

FIG. 22 is a first diagram illustrating an example of a display screen of the data processing device according to the second embodiment.

FIG. 23 is a second diagram illustrating an example of the display screen of the data processing device according to the second embodiment.

FIGS. 24A to 24C are third diagrams illustrating examples of the display screen of the data processing device according to the second embodiment.

FIGS. 25A and 25B are fourth diagrams illustrating examples of the display screen of the data processing device according to the second embodiment.

FIGS. 26A and 26B are fifth diagrams illustrating examples of the display screen of the data processing device according to the second embodiment.

FIG. 27 is a first diagram illustrating a configuration example of setting data used in the second embodiment.

FIG. 28 is a second diagram illustrating a configuration example of setting data used in the second embodiment.

FIG. 29 is a third diagram illustrating a configuration example of setting data used in the second embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

Embodiments of the present application (hereinafter referred to as “embodiments”) are described below in detail with reference to the drawings. Each drawing merely schematically illustrates the embodiments to allow sufficient understanding of the embodiments. Therefore, the embodiments are not limited to those shown in the drawings. In addition, in each drawing, common and similar components are marked with the same symbols, and duplicative explanations are omitted.

First Embodiment

<Configuration of Data Processing Device and Image Forming Device>

A configuration of a data processing device and an image forming device according to a first embodiment is explained below with reference to FIG. 1. FIG. 1 illustrates a configuration of a data processing device and an image forming device according to the first embodiment.

As shown in FIG. 1, a data processing device 2 and an image forming device 3 are communicably connected through a network 6, such as a local area network (LAN) and

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the like, and form an image forming system 1 (1a). In the first embodiment 1, explanations are made with assumptions that the data processing device 2 is configured with a personal computer (PC), that the image forming device 3 is configured from a printer, and that the network 6 is configured from a LAN, for example. Transmission and reception of data between the data processing device 2 and the image forming device 3 are performed through the LAN 6.

First, the configuration of the data processing device 2 is explained. The PC 2, as the data processing device, includes a controller 21, a memory part 22, an input part 23, a display part 24 and a communication part 26.

The controller 21 is a component that controls the operation of the PC 2 and is realized as a central processing unit (CPU) executes a control program stored in a read-only memory (ROM), a hard disk drive (HDD) and the like. At the controller 21, an operating system (hereinafter referred to as "OS") 20A is operated, which is a basic program for managing the entire operation of the PC 2 and for providing usage environment that is common in various application programs. In addition, at the controller 21, a printer driver 20B is operated, which is a program for executing print processes at the printer 3. The control program and the OS may be provided in a computer readable medium, such as a compact disk (CD) and the like.

The memory part 22 is a component that stores various data and programs and is configured from a random access memory (RAM), ROM, HDD and the like. The RAM temporarily stores data and the like that are necessary for executing various application programs on the OS 20A, for example. In the ROM, a boot program for starting the OS 20A stored in the HDD is stored. The HDD stores the OS 20A, the printer driver 20B, various application programs, data and the like.

The input part 23 is a component by which the user inputs various data and instructions and is configured from a keyboard, a mouse and the like. The display part 24 is a component that displays various images and is configured from a display, such as a liquid crystal display (LCD) and the like.

The communication part 26 is a component that transmits and receives various data (including commands) and is configured from an input/output port. The communication part 26 transmits to the printer 3 through the LAN 6 print data generated by a print data generation part 21b, a print interruption command, a copy count change command and the like. The "print interruption command" is a control command that instructs the printer 3 to interrupt the print process being executed. The "copy count change command" is a control command that instructs the printer 3 to change a number of print copies (or copy count) of the print data and to resume the print process (to reprint).

The controller 21 functions as a main controller 21a, the print data generation part 21b, a display controller 21c and a communication controller 21d.

The main controller 21a is a functional part that controls operation of each part. The controller 21a configures the print data generation part 21b and the printer driver 20B. The print data generation part 21b is a functional part that functions as a print data generating part that generates print data from document data created by application software. In addition, the print data generation part 21b generates a control command (print interruption command) that instructs the printer 3 to interrupt the print process being executed and generates a control command (copy count change command) that instructs the printer 3 to change the copy count of the print data and to execute the print process.

The display controller 21c is a functional part that controls a display operation of the display part 24. The communication

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controller 21d is a functional part that controls transmission and reception of the data (including commands) to and from an external device (here, printer 3) by the communication part 26.

Next, a configuration of the image forming device 3 is explained. The printer as the image forming device includes a controller 31, a memory part 32, an input part, a display part 34, a print part 35 and a communication part 36.

The controller 31 is a component that controls the operation of the printer 3 and is realized as a CPU executes a control program stored in a ROM and the like. The memory part 32 is a component that stores various data and programs and is configured from a RAM, ROM, flash memory and the like.

The input part 33 is a component by which the user inputs various data and the like and is configured from operation keys. The display part 34 is a component that displays various images and is configured from a display, such as an LCD and the like.

The print part 35 is a component that executes the print process. The communication part 36 is a component that transmits and receives various data and is configured from an input/output port. The communication part 36 receives various data and commands (e.g., print data, print interruption command, copy count change command) from the PC 2 through the LAN 6. The various data and commands received are stored in the memory part 32.

The controller 31 functions as a main controller 31a, an analysis part 31b, an edit and development part 31c, a print controller 31d, a notification part 31e and a communication controller 31f.

The main controller 31a is a functional part that controls operation of each part. The main controller 31a controls, for example, transmission and reception processes for various data and commands executed by the communication part 36, an analysis process executed by the analysis part 31b, an edit process and a development (rasterizing) process executed by the edit and development part 31c, and a scheduling process executed by the print controller 31d. The "scheduling process" means a process to adjust an order of the print processes to be executed.

The analysis part 31b analyzes the data and commands (specifically, print data, print interruption command, copy count change command, etc.) transmitted from the PC 2, received by the communication part 36, and stored in the memory part 32.

The edit and development part 31c edits and develops (rasterizes) the print data and generate raster data in which image contents are dot-patterned.

The print controller 31d schedules the print order of the raster data generated by the edit and development part 31c, outputs the raster data in the order to the print part 35, and causes the print part 35 to execute the print processes.

The notification part 31e notifies the PC 2, as a result information, whether or not a setting content of the copy count change command received by the communication part 36 is reflected in the print data.

<Operations of Data Processing Device and Image Forming Device>

Operations of the data processing device according to the first embodiment are explained below with reference to FIGS. 2A and 2B. In addition, operations of the image forming device are explained with reference to FIG. 6. FIGS. 2A and 2B are flow diagrams illustrating an entire operation of the data processing device according to the first embodiment. FIG. 6 is a flow diagram illustrating an entire operation of the image forming device according to the first embodiment.

The operation at each device is regulated by the programs readably stored in advance in the memory part of each device and is realized by the controller of each device. In addition, the communication between devices is performed as the receiving side device once stores the data received by the communication in the memory part and thereafter reads the data from the memory part. In addition, each data is outputted to the component that is required for performing the subsequent processes after being once readably stored in the memory part. Because these points are usual practices in information processing, detailed descriptions are omitted below.

(Operation of Data Processing Device)

First, the operation of the PC 2 as the data processing device 2 is explained. The PC 2 starts the series of processes as the user operates the PC 2 to instruct the printing of document data created by the application software.

First, as shown in FIGS. 2A and 2B, when the user operates a keyboard 23 to instruct the printing of the document data, the OS 20A detects the operation (S105) and starts the printer driver 20B in response to the detection (S110).

When the printer driver 20B is started, the main controller 21a of the printer driver 20B displays on the display part 24 a print setting screen 101 shown in FIG. 11, for example. In particular, the main controller 21a outputs a request for displaying the print setting screen 101 (display request) to the display controller 21c. When the display request is inputted from the main controller 21a, the display controller 21c reads out image data for displaying the print setting screen 101 from the memory part 22 and outputs the image data to the display part 24, causing the print setting screen 101 to be displayed on the display part 24. The operations of the main controller 21a and the display controller 21c for displaying various screens on the display part 24 are the same as the above-description. Therefore, the explanation is omitted below.

FIG. 11 is a diagram illustrating an example of a display screen of the data processing device according to the first embodiment and illustrates a configuration example of the print setting screen 101. The "print setting screen 101" is a dialogue box for instructing the printing of document data. In the example shown in FIG. 11, the print setting screen 101 includes an OK button 101a, a cancel button 101b, a copy count input area 101c for inputting a desired copy count, and the like. In the print setting screen 101, desired print setting may be inputted in each of print setting items, such as printer names and print ranges.

When the user does not instruct the printing and ends the process as is, the user presses the cancel button 101b. On the other hand, when the user instructs the printer 3 to print, the user appropriately inputs the desired print setting in each print setting item and presses the OK button 101a. Here, the explanation is made with an assumption that the user inputs the desired copy count (e.g., "10") in the copy count input area 101c in the print setting screen 101 and presses the OK button 101a.

When the print setting screen 101 is displayed on the display part 24, the main controller 21a of the PC 2 determines whether or not the cancel button 101b has been pressed by the user (S120). If the determination in S120 indicates that the cancel button 101b has been press ("Yes"), the main controller 21a ends the series of processes. In contrast, if the determination indicates that the cancel button 101b has not been press ("No"), the main controller 21a determines as to whether or not the OK button 101a has been press by the user (S125).

If the determination in S125 indicates that the OK button 101a has been press ("Yes"), the main controller 21a accepts

the print setting inputted in each print setting item in the print setting screen 101 (S130). At this time, the main controller 21a saves in the memory part 22 values of the print settings inputted in the respective print setting items in the print setting screen 101 (in particular, the copy count inputted in the copy count input area 101c shown in FIG. 11) as the print setting data. Below, the data that represents the value for the copy count is referred to as "copy count data." In the memory part 22, print setting data, such as computer names, IP addresses, port names and the like, are saved in advance. The print setting data that includes the copy count data is used for generating the print data, print interruption command, copy count change command and the like. In the meantime, if the determination in S125 indicates that the OK button 101a has not been pressed ("No"), the main controller 21a repeats the processes at S120 and S125.

After S130, the main controller 21a causes the print data generation part 21b and the communication controller 21d to execute a "print data generation and transmission" process and requests the printer 3 to print (S135). The printer 3 starts the print process by receiving the print data from the PC 2 in S305 shown in FIG. 6. Details of S135 are shown in FIG. 3. FIG. 3 is a flow diagram illustrating the operation of the data processing device according to the first embodiment at the time of generating and transmitting the print data.

As shown in FIG. 3, the main controller 21a first causes the print data generation part 21b to generate the print data (S135a). More specifically, the main controller 21a outputs a print data generation request to the print data generation part 21b. When the print data generation request is inputted from the main controller 21a, the print data generation part 21b generates image data used for the print process from document data and associates a print command with the image data to generate the print data. The "print command" is a control command for instructing the printer 3 to print an image represented by the image data included in the print data.

When the print data is generated, the main controller 21a reads out the print setting data (e.g., copy count, computer name, IP address, port name and the like) from the memory part 22 and changes a job type as "print." The main controller 21a also causes the print data generation part 21b to associate the print setting data with the print data (S135b). In particular, the main controller 21a outputs a request for associating the print setting data with the print data to the print data generation part 21b. When the request for associating the print setting data with the print data is inputted from the main controller 21a, the print data generation part 21b associates print data association setting data 201 shown in FIG. 16, for example, with the print data. Here, the explanation is made with an assumption that the print data generation part 21b associates setting data 201 in which the copy count is "10," with the print data. Below, the print data with which the setting data 201 has been associated is also referred to simply as "print data." For example, the print data generation part 21b, which is the print data generator, generates several different page image data (in this example, page image data composed of ten different pages) from the document data as the image data used for the print process according to instructions of the main controller 21a. Further, according to instructions of the main controller 21a, the print data generation part 21b adds setting data, which designate the copy count to be 10 copies, to the print data so that the print data generation part 21b generates the print data of total 100 pages by which 10 copies for each of the ten pages are made.

FIG. 16 is a diagram illustrating a configuration example of the setting data used in the first embodiment. FIG. 16 indicates, as the setting data 201, setting items, such as job type,

copy count, computer name, IP address, port name and the like, and values corresponding to the respective setting items.

After S135b, the main controller 21a causes the communication controller 21d to transmit the print data to the printer 3 (S135c). At this time, the communication controller 21d transmits the print data from the communication part 26 to the printer 3 through the LAN 6. When the print data is received from the PC 2, the printer 3 assigns a job ID to the print data and notifies the PC 2 of the job ID. Thereafter, the process moves to S136 shown in FIG. 2A.

As shown in FIG. 2A, after S135 (strictly speaking, S135c), the main controller 21a of the PC 2 receives the job ID from the printer 3 (S136). Then, the main controller 21a stores the job ID in the memory part 22 by associating the job ID with the print setting data including copy count data that is stored in the memory part 22 in S130. The job ID stored in the memory part 22 is used for generating setting data 202 and 203 (see FIGS. 17 and 18) that are associated with the print interruption command at the time of transmitting the print interruption command to the printer 3 in S170 shown in FIG. 2B or associated with the copy count change command at the time of transmitting the copy count change command to the printer 3 in S190 shown in FIG. 2B. Here, the explanation is made with an assumption that the job ID used as an ID that is generated by the printer 3. However, the PC 2 may generate the ID and use such ID.

After that, the main controller 21a displays on the display part 24 a copy count change screen 111 shown in FIG. 12, for example (S140). FIG. 12 is a diagram illustrating an example of a display screen of the data processing device according to the first embodiment and illustrates a configuration example of the copy count change screen 111. The "copy count change screen 111" is a dialogue box for instructing a change in the copy count. The copy count change screen 111 is preferably configured such that the copy count change screen 111 may be stored and displayed as being reduced in a part of an edge of the display part 24 (e.g., a side bar) by performing a predetermined operation. In the example shown in FIG. 12, the copy count change screen 101 includes an interrupt button 111a, an OK button 111b, a cancel button 111c, a copy count input area 111d for inputting a desired copy count, and the like. The explanation is made with an assumption that a value cannot be inputted in the copy count input area 111d immediately after S140 and that the value can be inputted when a print interruption command is transmitted to the printer 3 in S170 ("print interruption command transmission (print interruption request" process) shown in FIG. 2B.

The copy count change screen 111 is capable of instructing an interruption of print process, a change in the copy count, a cancellation of print instructions (job cancellation) for the print data (preferably, the most recent print data) transmitted to the printer 3. The copy count change screen 111 is continuously displayed while the print process is executed by the printer 3 and automatically closes (disappears) when the printing is completed. The copy count change screen 111 also closes when the cancel button 111c is pressed. The copy count change screen 111 is preferably configured to show a comparison of the settings before and after the change as shown in FIG. 12.

When the copy count change screen 111 is displayed on the display part 24 in S140, the user presses the cancel button 111c or the OK button 111b when the print process is to be executed by the printer 3 without changing the copy count. On the other hand, when the user changes the copy count, the user presses the interruption button 111a shown in FIG. 12 to interrupt the print process being executed by the printer. The printer 3 starts the print process when the print data transmit-

ted from the PC 2 in S135 is received, and transmits a print completion notification to the PC 2 when the print process is completed.

Then, when the copy count change screen 111 is displayed on the display part 24, the main controller 21a first determines whether or not the print completion notification has been received from the printer 3 (S145). If the determination in S145 indicates that the print completion notification has been received ("Yes"), the main controller 21a deletes the copy count data saved in the memory part 22 in S130 (S149), displays on the display part 24a notification screen (not shown) indicating the completion of the printing (preferably for a predetermined time) (S150), and ends the series of processes. If the print completion notification has not been received ("No"), the main controller 21a determines whether or not the cancel button 111c has been pressed by the user (S155).

If the determination in S155 indicates that the cancel button 111c has been pressed ("Yes"), the series of processes end. On the other hand, if the determination indicates that the cancel button 111c has not been pressed ("No"), the main controller 21a determines whether or not the OK button 111b has been pressed by the user (S160).

If the determination in S160 indicates that the OK button 111b has been pressed ("Yes"), the series of processes end. In contrast, if a determination indicates that the OK button 111b has not been pressed ("No"), the main controller 21a determines whether or not the cancel button 111a has been pressed by the user (S165).

If the determination in S165 indicates that the cancel button 111a has been pressed ("Yes"), the process moves to S170 shown in FIG. 2B via "A1." In contrast, if the determination in S125 indicates that the cancel button 111a has not been pressed ("No"), the main controller 21a repeats the determination processes in S155, S160 and S165.

If the determination in S165 indicates that the cancel button 111a has been pressed ("Yes"), the main controller 21a causes the print data generation part 21b to perform the "print interruption command transmission" process to request the printer 3 to interrupt the print process (S170). Details of S170 are shown in FIG. 4. FIG. 4 is a flow diagram illustrating the operation of the data processing device according to the first embodiment at the time of transmitting the print interruption command. When the "print interruption command transmission" process is executed in S170, the main controller 21a changes a screen setting of the copy count change screen 111 displayed on the display part 24 such that a value can be inputted in the copy count input area 111d.

As shown in FIG. 4, the main controller 21a causes the print data generation part 21b to associate setting data with the print interruption command (S170a). More specifically, the main controller 21a outputs a print interruption request to the print data generation part 21b. When the print interruption request is inputted from the main controller 21a, the print data generation part 21b associates print interruption command association setting data 202 shown in FIG. 17, for example, with the print data. Below, the print interruption command with the setting data 202 is referred to simply as "print data."

FIG. 17 is a diagram illustrating a configuration example of setting data used in the first embodiment. FIG. 17 indicates, as the setting data 202, setting items, such as job type, job ID, computer name, IP address, port name and the like, and values corresponding to the respective setting items.

After S170a, the main controller 21a causes the communication controller 21d to transmit the print interruption command to the printer 3 (S170b). Thereafter, the process moves to S175 shown in FIG. 2B.

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After that, if the user makes the printer 3 stands by while the print processes are being interrupted (if the user causes the PC 2 to close the copy count change screen 111), the user presses the cancel button 111c or the interruption button 111a shown in FIG. 13A. Alternatively, when the user changes the copy count, the user inputs a desired copy count in the copy count input area shown in FIG. 13A, and presses the OK button 111b. Yet alternatively, when the user instructs the printer to cancel the print instruction (job cancellation), the user inputs "0" in the copy count input area 111d shown in FIG. 13A and presses the OK button 111b.

Then, as shown in FIG. 2B, after S170 (strictly speaking, S170b), when the print interruption command is transmitted to the printer 3, the main controller 21a determines whether or not the cancel button 111c has been pressed by the user. If the determination in S175 indicates that the cancel button 111c has been pressed ("Yes"), the main controller ends the series of processes. On the other hand, if the determination indicates that the cancel button 111c has not been pressed ("No"), the main controller 21a determines whether or not the OK button 111b has been pressed by the user (S180).

If the determination in S180 indicates that the OK button 111b has been pressed ("Yes"), the main controller 21a accepts a change in the print setting inputted in each print setting item in the print setting screen 101 (S185). At this time, the main controller 21a updates the copy count data saved in the memory part 22 to the copy count data inputted to the copy count input area 111d in the copy count change screen 111. That is, the main controller 21a overwrites the copy count data inputted to the copy count input area 111d in the copy count change screen 111 on the copy count data saved in the memory part 22 in S130. Here, the explanation is made with an assumption that the value "10" of the copy count data in the print setting accepted in S130 shown in FIG. 2A is changed to a value "1."

When the main controller 21a accepts the change in the print settings that are inputted in the respective print setting items in the copy count change screen 111, the main controller 21a causes the print data generation part 21b to execute the "copy count change command transmission" process to request the printer 3 to change the copy count and to execute the reprinting (S190). Details of S190 are shown in FIG. 5. FIG. 5 is a flow diagram illustrating an operation of the data processing device according to the first embodiment at the time of transmitting a copy count changing command.

As shown in FIG. 5, the main controller 21a causes the print data generation part 21b to associate setting data with the copy count change command (S190a). More specifically, the main controller 21a outputs a copy count change request to the print data generation part 21b. When the copy count change request is inputted from the main controller 21a, the print data generation part 21b associates copy count change command association setting data 203 shown in FIG. 18, for example, with the copy count change command. Below, the copy count change command with the setting data 203 is referred to simply as "copy count change command." The copy count change command may be replaced by data with a configuration similar to the print data (more specifically, a so-called re-print data in which a control command that instructs the change in the copy count and the resuming (reprinting) of the print process is associated with the image data generated from document data).

FIG. 18 is a diagram illustrating a configuration example of the setting data used in the first embodiment. FIG. 18 indicates, as the setting data 203, setting items, such as job type, job ID, copy count, computer name, IP address, port name and the like, and values corresponding to the respective set-

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ting items. Here, in the setting data 203, the value of the copy count data is set to "1" to change the copy count by which the printer 3 performs the print process from "10" to "1."

After S190a, the main controller 21a causes the communication controller 21d to transmit the copy count change command to the printer 3 (S190b). Thereafter, the process moves to S195 shown in FIG. 2B.

Here, when the printer 3 receives the copy count change command transmitted from the PC 2 in S190, the printer 3 changes the copy count, transmits to the PC 2 a setting change notification that indicates that the copy count has been changed, and resumes the print process (executes the reprinting). Then, when the print process is completed, the printer 3 transmits a print completion notification to the PC 2.

Therefore, as shown in FIG. 2B, after S190, the main controller 21a receives the setting change notification from the printer 3. When the main controller 21a receives the setting change notification from the printer 3, the main controller 21a displays on the display part 24a notification screen (e.g., notification screen 115 shown in FIG. 15B) indicating that the copy count has been changed (S200) and determines whether or not a print completion notification has been received from the printer 3 (S205).

If the determination in S205 indicates that the print completion notification has been received ("Yes"), the process moves to S149 ("copy count data deletion" process) shown in FIG. 2A via "A3." In this case, the main controller 21a ends the series of processes after executing the "print completion display" process in S150. On the other hand, if the determination in S205 indicates that the print completion notification has not been received ("No"), the main controller 21a repeats the determination process in S205.

If a determination in S180 indicates that the OK button 111b has not been pressed ("No"), the main controller 21a determines whether or not the cancel button 111a has been pressed by the user (S210).

If the determination in S210 indicates that the interrupt button 111a has been pressed ("Yes"), the main controller 21a ends the series of processes. On the other hand, if the determination in S210 indicates that the interrupt button 111a has not been pressed ("No"), the main controller determines whether or not a predetermined time has elapsed since the transmission of the print interruption command in S170 (S215).

If the determination in S215 indicates that the predetermined time has elapsed ("Yes"), the main controller 21a ends the series of processes. In contrast, if the determination in S215 indicates that the predetermined time has not elapsed ("No"), the main controller 21a repeats the determination processes in S175, S180, S210 and S215.

(Operation of Image Forming Device)

Next, the operation of the printer 3 as the image forming device is explained. When the printer 3 receives the print data from the PC 2, the printer 3 starts the print process after storing the print data in the memory device 32. Then, if the printer 3 receives the print interruption command from the PC 2, the printer 3 interrupts the print process and stores history data at the time of interruption in the memory part 32. After that, if the printer 3 receives the copy count change command from the PC 2, the printer specifies a unprocessed copy count based on the number of printed copies indicated by the history data at the time of the interruption and the copy count after the change designated by the copy count change command, and executes the print process for the unprocessed copy count.

The operation of the printer 3 changes depending on the relationships between the following three types of the copy count: (1) the copy count before the change designated by the

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print data (strictly speaking, the copy count data attached to the print data as the setting data) stored in the memory part 32; (2) the copy count that has already been printed as indicated by the history data at the time of interruption; and (3) the copy count after the change designated by the copy count change command. The PC 2 changes the screen patterns displayed on the display part 24 as shown in FIGS. 13A to 15B, for example, in response to the change in the operation of the printer 3. The change in the screen patterns is explained in the section of “Examples of display screen of data processing device.”

Here, the explanation is made with an assumption that the PC 2 executes the “print data generation and transmission (print request)” process in S135 shown in FIG. 2A and that the printer 3 starts the series of processes by receiving the print data transmitted from the PC 2 in the process in S135.

First, as shown in FIG. 6, when the printer 3 receives the print data from the PC 2 by the communication part 36, the main controller 31a causes the print controller 31d to execute the print process (S310). Details of S310 are shown in FIG. 7. FIG. 7 is a flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of executing the printing.

As shown in FIG. 7, in the printer 3, the main controller 31 (or the communication controller 31f) assigns (sets) an job ID to the print data received from the PC 2 and stores the print data in the memory part 32 (S310a). Then, the main controller 31a causes the communication controller 31f to notify (transmit to) the PC 2 the job ID assigned to the print data.

Next, the main controller 31a causes the analysis part 31b to analyze the print data and to specify the copy count (S310c). More specifically, the main controller 31a outputs a print data analysis request stored in the memory part 32 to the analysis part 31b. When the analysis part 31b receives an input of the analysis request from the main controller 31a, the analysis part 31b reads out the print data from the memory part 32 and analyses the read-out print data. Then, the analysis part 31b specifies the copy count to be printed and the like based on the copy count data associated with the print data as setting data and outputs the copy count and the like as the analysis result to the main controller 31a. Here, a value “10” is assumed to be designated as the value for the copy count in the copy count data associated with the print data. Therefore, the analysis part 31b outputs to the main controller 31a “10,” which is the value of the copy count, as the analysis result. Below, the copy count designated by the copy count data associated with the print data is referred to as a “copy count before change.” When the value of the copy count before change is inputted as the analysis result from the analysis part 31b, the main controller 31a stores the value of the copy count before change in the memory part 32. In addition, the main controller 31a stores in the memory part 32 the value of the copy count before change as the value of the copy count to be printed.

When the analysis result is inputted from the analysis part 31b, the main controller 31a causes the edit and development part 31c to execute the editing process and development process for the print data (S310d). More specifically, the main controller 31a outputs a print data editing and development request to the edit and development part 31c. At this time, the main controller 31a requests the edit and development part 31c to repeat the editing process and development process for the print data by the copy count (i.e., 10) set to the print data. When the print data editing and development request is inputted, the edit and development part 31c edits (executes a process to convert image contents into an intermediate language) and develops (executes a process to convert the image

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contents converted into the intermediate language into dot patterns) of the print data, generates raster data and store the generated raster data in the memory part 32.

When the raster data is stored in the memory part 32, the main controller 31a causes the print controller 31d to schedule the raster data (to execute a process to adjust the execution order of the print processes) (S310e). Then, the main controller 31a causes the print controller 31d to output the raster data to the print part 35 (S310f). As a result, the print part 35 executes a print process based on the raster data. After this, the process moves to S315 shown in FIG. 6.

As shown in FIG. 6, after S310 (strictly speaking, S310f), the main controller 31a determines whether or not the print process has completed (S315). If the determination in S315 indicates that the print process has completed (“Yes”), the main controller 31a updates the printed history data (not shown) stored in a predetermined memory region in the memory part 32 (S320). The “printed history data” indicates data that represents history of the print data for which the print process has been executed.

After the main controller 31a updates the printed history data, the main controller 31a causes the notification part 31e and the communication controller 31f to transmit a print completion notification to the PC 2 (S325). More specifically, the main controller 31a outputs a print completion notification transmission request to the notification part 31e and the communication controller 31f. In response to the transmission request, the notification part 31e generates a message data as the print completion notification indicating that the print has completed, and the communication part 31f transmits the generated message data from the communication part 36 to the PC 2 through the LAN 6.

After S325, the main controller 31a deletes the print data for which the print process has been executed, from the memory part 32 (S330) and ends the series of processes.

If the determination in S315 indicates that the print process has not been completed (“No”), the main controller 31a determines whether or not a print interruption command has been received (S335). The determination in S335 indicates “Yes” when the PC 2 transmits a print interruption command in S170 shown in FIG. 2B. If the determination in S335 indicates that the print interruption command has been received (“Yes”), the process moves to S340. On the other hand, if the determination in S335 indicates that the print interruption command has not been received (“No”), the main controller 31a repeats the determination processes in S315 and S335.

If the determination in S335 indicates that the print interruption command has been received (“Yes”), the main controller 31a interrupts the print process being executed by the print controller 31d (S340). Details of S340 are shown in FIG. 8. FIG. 8 is a flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of cancelling the printing.

As shown in FIG. 8, in the printer 3, the main controller 31a (or the communication controller 31f) first stores in the memory part 32 the print interruption command received from the PC 2 (S340a). At that time, the main controller 31a assigns a job ID to the print interruption command. The job ID assigned to the print interruption command is associated with the job ID assigned to the print data that is determined at the time of analyzing the print interruption command in S340b. The data representing the association is stored in the memory part 32.

Next, the main controller 31a causes the analysis part 31b to analyze the print interruption command and to specify the print data for which the process is to be interrupted (S340b). More specifically, the main controller 31a outputs to the

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analysis part 31*b* an analysis request for the print interruption command stored in the memory part 32. When the analysis request is inputted from the main controller 31*a*, the analysis part 31*b* reads out the print interruption command from the memory part 32 and analyzes the read-out print interruption command. Then, the analysis part 31*b* specifies the job ID assigned to the print data for which the process is to be interrupted and outputs the job ID as an analysis result to the main controller 31*a*.

Next, the main controller 31*a* executes a “print data search” process to search the print data specified by the print interruption command (hereinafter, referred to as “matched print data”) in the memory part 32 (S340*c*). Details of S340*c* are shown in FIG. 9. FIG. 9 is a flow diagram illustrating the operation of the image forming device according to the first embodiment at the time of searching the print data.

As shown in FIG. 9, the main controller 31*a* reads out from the memory part 32 single print data stored in the memory part 32 (S341*a*) and determines whether or not the print data has been read out (S341*b*).

If the determination in S341*b* indicates that the print data has been read out (“Yes”), the main controller 31*a* determines whether or not the read-out print data matches host data (job ID (or computer name, IP address, port name, etc.)) of the print data for which the process is to be interrupted that is specified by the print interruption command (S341*c*).

If the determination in S341*c* indicates that the read-out print data matches the host data (“Yes”), the main controller 31*a* determines that the matched print data is present (exists) in the memory part 32 and recognizes that a search result is OK (S341*d*). After that, the process moves to S340*d* shown in FIG. 8.

On the other hand, if the determination in S341*c* indicates that the read-out print data does not match the host data (“No”), the process returns to S341*a*. As a result, the main controller 31*a* reads out the next print data from the memory part 32 in S341*a* and determines whether the next print data read out in S341*b* matches the host data of the print data for which the process is to be interrupted that is specified by the print interruption command. Then, if the print data that eventually matches the host data does not exist in the memory part 32 (i.e., if the determination is made as “No” in S341*b*), the main controller 31*a* determines that the matched print data is not present (does not exist) in the memory 32 and recognizes that the search result is NG (S341*e*). After this, the process moves to S340*d* shown in FIG. 8.

As shown in FIG. 8, after S340*c* (“print data search” process), the main controller 31*a* determines whether or not the search result is OK (i.e., whether or not the matched print data exists in the memory part 32) (S340*d*).

If the determination in S340*d* indicates that the search result is OK, that is, the matched print data exists in the memory part 32 (“Yes”), the main controller 31*a* determines whether or not the print process for the matched print data is being executed (S340*e*). On the other hand, if the determination in S340*d* indicates that the search result is NG, that is, the matched print data does not exist in the memory part 32 (“No”), the process moves to S345 shown in FIG. 6.

If the determination in S340*e* indicates that the print process for the matched print data is being executed (“Yes”), the main controller 31*a* causes the print controller 31*d* to interrupt the print process being executed (S340*f*). More specifically, the main controller 31*a* outputs a print interruption request to the print controller 31*d*. When the print interruption request is inputted from the main controller 31*a*, the print controller 31*d* interrupts the output of the raster data to the

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print part 35. As a result, the print part 35 interrupts the print process being executed. After this, the process moves to S345 shown in FIG. 6.

As shown in FIG. 6, after S340, the main controller 31*a* updates the print interruption history data (not shown) that is stored in a predetermined memory region in the memory part 32 (S345). At this time, in the print interruption history data, a value of the copy count that has been executed at the time when the print process (here, referred to as “printed copy count”) was interrupted is stored. The “print interruption history data” indicates data that indicates history of print data for which the execution of the print data is interrupted.

When the print interruption history data is updated, the main controller 31*a* causes the notification part 31*e* and the communication controller 31*f* to transmit a print interruption notification to the PC 2 (S350). More specifically, the main controller outputs a print interruption notification transmission request to the notification part 31*e* and the communication controller 31*f*. In response to the transmission request, the notification part 31*e* generates message data as the print interruption notification that indicates that the printing has been interrupted, and the communication controller 31*f* transmits the generated message data from the communication part 36 to the PC 2 through the LAN 6.

After S350, the main controller 31*a* determines whether or not predetermined time has elapsed since the interruption of the print process in S340 (S355). If the determination in S355 indicates that the predetermined time has elapsed (“Yes”), the main controller 31*a* deletes the print data stored in the memory part 32 in S310*a* shown in FIG. 7 (S360) and ends the series of processes. On the other hand, if the predetermined time has not elapsed (“No”), the main controller 31*a* determines whether or not a copy count change command has been received from the PC 2 (S365). The determination in S365 indicates “Yes” when the PC 2 transmits the copy count change command in S190 shown in FIG. 2B.

If the determination in S365 indicates that the copy count change command has been received (“Yes”), the main controller 31*a* causes the print controller 31*d* to execute the reprinting (S370) and ends the series of processes. On the other hand, if the determination in S365 indicates that the copy count change request has not been received (“No”), the main controller 31*a* repeats the determination processes in S355 and S365. Details of S370 are shown in FIGS. 10A to 10D. FIGS. 10A to 10D are flow diagrams illustrating the operations of the data processing device according to the first embodiment at the time of executing the re-printing.

As shown in FIGS. 10A to 10D, in the printer 3, the main controller 31*a* (or communication controller 31*f*) first stores the copy count change command received from the PC 2 in the memory part 32 (S370*a*). At this time, the main controller 31*a* assigns a job ID to the copy count change command. The job ID assigned to the copy count change command is associated with the job ID assigned to the print data that is determined at the time of analyzing the copy count change command in S370*b*. The data representing the association is stored in the memory part 32.

Next, the main controller 31*a* causes the analysis part 31*b* to analyze the print copy count change command and to specify the print data for which the copy count is to be changed (S370*b*). More specifically, the main controller 31*a* outputs to the analysis part 31*b* an analysis request for the copy count change command stored in the memory part 32. When the analysis request is inputted from the main controller 31*a*, the analysis part 31*b* reads out the copy count change command from the memory part 32 and analyzes the read-out copy count change command. Then, the analysis part 31*b*

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specifies the print data for which the copy count is to be changed, the copy count and the like and outputs, as the analysis result, the print data for which the copy count is to be changed, the copy count and the like to the main controller 31a. Below, the copy count designated by the copy count change command is referred to as a “copy count after change.” When the value of the copy count after change is inputted as the analysis result from the analysis part 31b, the main controller 31a stores the value of the copy count after change in the memory part 32.

Next, the main controller 31a executes a “print data search” process in the steps similar to the process shown in FIG. 9, to search the print data specified by the copy count change command (hereinafter, referred to as “matched print data”) in the memory part 32 (S370c).

After S370c, the main controller 31a determines whether or not the search result is OK (i.e., whether or not the matched print data exists in the memory part 32) (S370d). If the determination in S370d indicates that the search result is OK, that is, the matched print data exists in the memory part 32 (“Yes”), the process moves to S370e shown in FIG. 10B via “B1.” On the other hand, if the determination in S370d indicates that the search result is not OK, that is, the matched print data does not exist in the memory part 32 (“No”), the main controller 31a ends the series of processes.

If the determination in S370d indicates that the search result is OK (“Yes”), the main controller 31a determines that the copy count after change (i.e., the copy count designated by the copy count change command) is less than the copy count before change (i.e., the copy count designated by the print data”) (S370e).

If the determination in S370e indicates that the copy count after change is less than the copy count before change (“Yes”), the main controller 31a determines whether or not the copy count after change is not “0” (copy count after change ≠ 0) (S370f). On the other hand, if the determination in S370e indicates that the copy count after change is equal to or more than the copy count before change (“No”), the process moves to S370h before the determination indicates that there is unprocessed printing.

If the determination in S370f indicates that the copy count after change is not “0” (“Yes”), the main controller 31a determines whether or not there is unprocessed printing (S370g). On the other hand, of the determination in S370f indicates that the copy count after change is “0” (“No”), the process moves to S370q shown in FIG. 10C via “B3.”

If the determination in S370g indicates that there is unprocessed printing (“Yes”), the main controller 31a updates the value of the copy count to be printed that is stored in the memory part 32 (see S310c shown in FIG. 7) from the value of the copy count before change (e.g., 10) to the value of the copy count after change (e.g., 1) (S370h). On the other hand, if the determination in S370g indicates that there is no unprocessed printing (“No”), the process moves to S370i shown in FIG. 10D via “B4.”

After S370h, the main controller 31a calculates a value of the unprocessed copy count from below Equation 1 using the value of the copy count already printed that was stored in the memory part 32 as the history data in S345 shown in FIG. 6 and the value of the copy count to be printed (i.e., copy count after change) that was updated in S370h (S370i).

$$\text{Unprocessed copy count} = (\text{Copy count after change} - \text{Copy count already printed}) \quad (1)$$

S370e to S370i configure the “unprocessed copy count specification” process (S371).

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After S370i, the main controller 31a causes the edit and development part 31c to execute the editing process and development process for the print data for the unprocessed copy count (S370j). More specifically, the main controller 31a outputs a print data editing and development request to the edit and development part 31c. At this time, the main controller 31a requests the edit and development part 31c to repeats the editing process and development process for the print data for the unprocessed copy count. When the print data editing and development request is inputted, the edit and development part 31c edits and develops of the print data, generates raster data and store the generated raster data in the memory part 32.

When the raster data is stored in the memory part 32, the main controller 31a causes the print controller 31d to schedule the raster data (to execute a process to adjust the execution order of the print processes) (S370k). Then, the main controller 31a causes the print controller 31d to output the raster data to the print part 35 (S370l). As a result, the print part 35 resumes a print process (executes re-printing) based on the raster data.

When the print process is resumed, the main controller 31a causes the notification part 31e and the communication controller 31f to transmit the setting change notification to the PC 2 to notify the PC 2 that the setting content designated by the copy count change command (e.g., copy count=“1”) has been reflected to the print data (S370m). More specifically, the main controller outputs a setting change notification transmission request to the notification part 31e and the communication controller 31f. In response to the transmission request, the notification part 31e generates message data as the setting change notification that indicates that the copy count has been changed and that the print process is to be resumed (e.g., “Copy count has been changed. Printing will be resumed.”), and the communication controller 31f transmits the generated message data from the communication part 36 to the PC 2 through the LAN 6. In response, the PC 2 displays the notification screen 112 shown in FIG. 13B, for example, on the display part 24.

After S370m, the main controller 31a updates the printed history data (not shown) stored in a predetermined memory region in the memory part 32 so that printed history data indicates that the print process was resumed (reprinted) (S370n). Similar to S325 shown in FIG. 6, after the main controller 31a updates the printed history data, the main controller 31a causes the notification part 31e and the communication controller 31f to transmit a print complication notification to the PC 2 (S370o). Then, the main controller 31a deletes the print data for which the print process has been executed, from the memory part 32 (S370p) and ends the series of processes.

If the determination in S370f shown in FIG. 10B indicates that the copy count after change is “0” (“No”), the main controller 31a deletes the print data stored in the memory part 32 in S310a shown in FIG. 7 and executes cancellation of print request (job cancellation) for the print data received in S305 shown in FIG. 6, as shown in FIG. 10C (S370q).

When the job cancellation is executed, the main controller 31a causes the notification part 31e and the communication controller 31f to transmit the setting change notification to the PC 2 to notify the PC 2 that the job cancellation has been executed (S370r). More specifically, the main controller outputs a setting change notification transmission request to the notification part 31e and the communication controller 31f. In response to the transmission request, the notification part 31e generates message data as the setting change notification that indicates that the job cancellation has been executed (e.g.,

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"Printing has been cancelled."), and the communication controller 31f transmits the generated message data from the communication part 36 to the PC 2 through the LAN 6. The PC 2 receives this message data (setting change notification) in S195 shown in FIG. 2B. In response, the PC 2 displays the notification screen 114 shown in FIG. 14B, for example, on the display part 24.

After S370r, the main controller 31a updates the print interruption history data (not shown) stored in the memory part 32 so that the print interruption history data indicates that the process status of the print data changed from the interruption state to cancellation state (S370s) and ends the series of processes.

Further, if the determination in S370g shown in FIG. 10B indicates that there is no unprocessed printing ("No"), the main controller 31a executes cancellation of a request (job cancellation) for changing the copy count by the copy count change command received in S365 shown in FIG. 6 and execute cancellation of a request for resuming the print process (reprinting) (hereinafter referred to as "reprint cancellation"), as shown in FIG. 10D (S370t).

When the reprint cancellation is executed, the main controller 31a causes the notification part 31e and the communication controller 31f to transmit the setting change notification to the PC 2 to notify the PC 2 that the print process for the designated copy count has been completed (already printed) and that the reprinting cancellation is to be executed (S370u). More specifically, the main controller 31a outputs a setting change notification transmission request to the notification part 31e and the communication controller 31f. In response to the transmission request, the notification part 31e generates message data as the setting change notification that indicates that the designated copy count has been printed and that the reprinting cancellation is to be executed (e.g., "Set copy count has already been printed. Printing will be cancelled."), and the communication controller 31f transmits the generated message data from the communication part 36 to the PC 2 through the LAN 6. The PC 2 receives this message data (setting change notification) in S195 shown in FIG. 2B. In response, the PC 2 displays the notification screen 113 shown in FIG. 13C, for example, on the display part 24.

After S370u, the main controller 31a updates the print interruption history data (not shown) stored in the memory part 32 so that the print interruption history data indicates that the process status of the print data indicates that printing was performed and that the reprinting cancellation was executed (S370v) and ends the series of processes.

<Example of Display Screen of Data Processing Device>

The explanation is made below based on the example of a display screen of the PC 2 as the data processing device with reference to FIGS. 11 to 15B. FIGS. 11 to 15B each illustrate an example of a display screen of the data processing device according to the first embodiment.

As described above, FIG. 11 illustrates a configuration example of the print setting screen 101. The PC 2 displays the print setting screen 101 on the display part 24 in S115 shown in FIG. 2A. When the user requests the printer 3 to print, the user inputs a desired value in each input area in the print setting screen 101 (e.g., input "10" in the copy count input area 101c) and presses the OK button 101a. The print setting screen 101 closes when the OK button 101a or the cancel button 101b is pressed. After that, the copy count change screen 111 (see FIG. 12) is displayed on the display part 24.

As described above, FIG. 12 illustrates a configuration example of the copy count change screen 111. The PC 2 displays the copy count change screen 111 on the display part 24 in S140 shown in FIG. 2A. When the user causes the

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printer to execute the print process as is without changing the copy count, the user presses the OK button 111b or the cancel button 111c. The copy count change screen 111 closes when the OK button 111b or the cancel button 111c is pressed. Moreover, when the user changes the copy count, the user inputs a desired value in the copy count input area 111d and presses the OK button 111b after pressing the interrupt button 111a to cause the printer 3 to interrupt the print process being executed. In this case, the copy count change screen 111 is closed at a predetermined timing, such as a timing when the print completion notice is received from the printer in S145 shown in FIG. 2A or S205 shown in FIG. 2B.

The printer 3 interrupts the print process when the user presses the interrupt button 111a. Thereafter, when the user inputs a desired value in the copy count input area 111d and presses button 111d, the printer 3 resumes (reprint) the print process. After that, one of notification screens 112, 113, 114 and 115 shown in FIGS. 13A to 15B is displayed (preferably for predetermined time) on the display part 24 depending on the value input in the copy count input area 111d in the copy count change screen 111 or depending on a status of progress of the print process by the printer 3. These notification screens 112, 113, 114 and 115 are overlaid on the copy count change screen 111 if the copy count change screen 111 is being displayed.

FIGS. 13A to 13C each illustrate an example of a display screen when the user inputs a value (e.g., 1), as the value of the copy count after change, that is less than the copy count before change, in the copy count input area 111d. In this case, the main controller 31a of the printer 3 determines "Yes" in S370e (determination process for "Copy count after change<Copy count before change?") shown in FIG. 10B and determines "Yes" in S370f (determination process for "Copy count after change≠0?") shown in FIG. 10B. Then, the main controller 31a of the printer 3 determines whether or not there is unprocessed printing in S370g shown in FIG. 10B.

If the determination in S370g indicates that there is unprocessed printing ("Yes"), the main controller 31a of the printer 3 transmits to the PC 2 message data as a setting change notification that indicates that the copy count has been changed and that the print process is to be resumed, in S370m shown in FIG. 10B. As a result, the PC 2 displays the notification screen 112 shown in FIG. 13B on the display part 24 in S200 shown in FIG. 2B.

On the other hand, if the determination in S370g indicates that there is no unprocessed printing ("No"), the main controller 31a of the printer 3 transmits to the PC 2 message data as the setting change notification that indicates that the designated copy count has been printed and that reprinting is to be cancelled, in S370u shown in FIG. 10D. As a result, the PC 2 displays the notification screen 113 shown in FIG. 13C on the display part 24 in S200 shown in FIG. 2B.

FIGS. 14A and 14B each illustrate an example of a display screen when the user inputs "0" as a value of the copy count after change in the copy count input area 111d. In this case, the main controller 31a of the printer 3 determines "Yes" in S370e (determination process for "Copy count after change<Copy count before change?") shown in FIG. 10B and determines "No" in S370f (determination process for "Copy count after change≠0?") shown in FIG. 10B. Then, the main controller 31a of the printer 3 transmits to the PC 2 message data as the setting change notification that indicates that the job cancellation has been executed, in S370r shown in FIG. 10C. As a result, the PC 2 displays the notification screen 114 shown in FIG. 14B on the display part 24 in S200 shown in FIG. 2B.

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FIGS. 15A and 15B each illustrate an example of a display screen when the user inputs a value (e.g., 20), as the value of the copy count after change, that is more than the copy count before change, in the copy count input area 111d. In this case, the main controller 31a of the printer 3 determines “No” in S370e (determination process for “Copy count after change<Copy count before change?”) shown in FIG. 10B. Then, the main controller 31a of the printer 3 transmits to the PC 2 message data as the setting change notification that indicates that the copy count has been changed and that the print process is to be resumed, in S370m shown in FIG. 10B. As a result, the PC 2 displays the notification screen 115 shown in FIG. 15B on the display part 24 in S200 shown in FIG. 2B.

As a result, the PC 2 as the data processing device according to claim 1 displays the copy count change screen 111 on the display part 24 when the print data is transmitted to the printer 3. Therefore, when the user changes the copy count, because user can determine preferable settings for the respective print setting items based on the settings displayed on the copy count change screen 111, the user need not memorize the past print settings or manually input the print settings. Accordingly, the data processing device reduces the user's burden to change the copy count.

With the conventional data processing device, when a print job is to be cancelled, the designation of a job ID to be cancelled is often time consuming, causing difficulty in executing the job cancellation.

Specifically, in the conventional data processing device, when the user cancels a print instruction, the data processing device displays on a display part job IDs received from an image forming device and asks the user to designate a job ID to be cancelled. At this time, if there is a plurality of job IDs, the plurality of job IDs are listed. However, if there is a large number of job IDs, the user spends time to find the job ID to be cancelled. Therefore, while the user is finding the job ID to be cancelled, or even if the user finds it, while the user is selecting the job ID to be cancelled by predetermined steps, the print process may be completed. As a result, the conventional data processing device, the job cancellation may not be executed. Especially, an image forming device that prints a job with high priority first has recently been proposed. In this device, because the job order may not be in sequence, it is time consuming to find a job ID to be cancelled. As a result, cases in which the job cancellation is not executed are presumably increased.

In contrast, the PC 2 according to the first embodiment interrupts the print process merely by displaying the copy count change screen 111 (see FIG. 12) on the display part 24 and having the user press the interrupt button 111a displayed on the copy count change screen 111, in conjunction with the transmission of the print data. As a result, the data processing device 2 simplifies steps for finding the job ID to be cancelled and steps for selecting the job ID to be cancelled. As such, the user can designate the job ID to be cancelled at a short period of time. Therefore, the data processing device 2 executes job cancellation at a higher rate than the conventional data processing device.

As described above, according to the data processing device according to the first embodiment, when the user changes the copy count, the user can determine a preferable setting for each print setting item based on the settings displayed in the copy count change screen. Therefore, the user need not memorize the past print settings or manually input the print settings. Therefore, the data processing device reduces the burden at the user for changing the copy count.

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In addition, the data processing device simplifies steps for finding the job ID to be cancelled and steps for selecting the job ID to be cancelled. As such, the user can designate the job ID to be cancelled at a short period of time.

Therefore, the data processing device executes job cancellation at a high rate.

Moreover, according to the image forming device of the first embodiment, when a print interrupt command that instructs interruption of the print process and a copy count change command that instruct change in the copy count for the print data is received from the data processing device, the unprocessed copy count is specified, and the print process for the unprocessed copy count is executed. Because the image forming device automatically executes the print process for the unprocessed copy count, the user needs not count the copy count that the image forming device printed, to determine whether or not there is any insufficient copy count. If there is insufficient copy count, the user needs to specify the insufficient copy count and change the print configurations. Accordingly, the image forming device reduces the user's burden to change the copy count.

Second Embodiment

<Configuration of Data Processing Device and Image Forming Device>

In a second embodiment, the data processing device is configured as a scanner. A configuration of a data processing device and an image forming device according to the second embodiment is explained below with reference to FIG. 19. FIG. 19 illustrates a configuration of a data processing device and an image forming device according to the second embodiment.

As shown in FIG. 1, an image forming system 1 (1b) according to the second embodiment is configured with a scanner 4 as the data processing device and the printer 3 as the image forming device, which are communicably connected through a network 6, such as LAN or the like. The configuration of the printer 3 has already been explained in the first embodiment. Therefore, the detailed description of the printer 3 is omitted here.

Similar to the PC 2 in the first embodiment, the scanner 4 includes a function to transmit to the printer 3 various command, such as the print interruption command, copy count change command and the like.

Different from a general scanner, the scanner 4 includes a function to receive various notifications, such as a print completion notification, a setting change notification and the like, from the printer 3 and to switch a screen to display on a display part (input display part 43) when a notification are received.

The scanner 4 actively obtains the various notifications from the printer 4. More specifically, as the scanner 4 transmits to the printer 3 commands, such as a print command (copy command), a print interruption command, a copy count change print and the like, the printer 3 transmits to the scanner 4 various notifications as response to the commands.

The scanner 4 includes a controller 41, a memory part 42, an input display part 43 and a communication part 46. The controller 41, memory part 42, input display part 43 and communication part 46 are components that correspond to the controller 21, memory part 22 and the communication part, respectively, in the first embodiment. In addition, the input display part 43 is a component that includes functions of both the input part 23 and the display part 24 in the first embodiment.

The controller **41** is a component that controls the operation of the scanner **4** and is realized by a CPU to execute a control program stored in a ROM and the like. The memory part **42** is a component that stores various data and programs and is configured from a random access memory, ROM and the like.

The input display part **43** is a component that displays various images and that allows the user to input various data and instructions. The input display part **43** is configured from a touch panel type operational panel. The communication part **46** is a component that transmits and receives various data (including commands) and is configured from an input/output (I/O) port.

The controller **41** functions as a main controller **41a**, an image reading part **41b**, an image data converter **41c**, a display controller **41d** and a communication controller **41e**.

The main controller **41a** and the communication controller **41e** are functional parts that correspond to the main controller **21a** and the communication controller **21d**, respectively, in the first embodiment. The image reading part **41b** is a functional part that optically reads a document and obtains (generates) read image data of the document.

The image data converter **41c** is a functional part that converts the read image data obtained by the image reading part **41b** into image data in a format printable at the printer **3**. The image data converter **41c** functions as a print data generator that generates print data by associating a print command (copy command) with the converted image data. In addition, the image data converter **41c** also generates various commands, such as the print interruption command, copy count change command and the like. The display controller **41d** is a functional means that corresponds to the display controller **21c** in the first embodiment and controls display operations of the input display part **43**.

<Operation of Data Processing Device and Image Forming Device>

The operation of the data processing device (scanner **4**) according to the second embodiment is explained below with reference to FIGS. **20** and **2B**. FIG. **20** is a flow diagram illustrating the entire operation of the data processing device according to the second embodiment.

Similar to the PC **2** according to the first embodiment, the scanner **4** according to the second embodiment executes the process shown in FIG. **2B** when the determination in **S165** shown in FIG. **20** indicates that the interrupt button **111a** is pressed (“Yes”).

Moreover, the operation of the image forming device (printer **3**) according to the second embodiment is the same as the operation of the image forming device (printer **3**) according to the first embodiment shown in FIG. **6**. Therefore, the operation of the image forming device according to the second embodiment are understood from the operation of the image forming device according to the above-described first embodiment, and thus the detailed explanations are omitted.

(Operation of Data Processing Device)

When the user turn on the power or when the user touches the input display part **43** during a power saving mode, the scanner **4** starts the series of processes. Here, it is assumed that a document has been set on the scanner **4** and that a print process has not been executed by the printer **3**.

As shown in FIG. **20**, compared with the operation (see FIGS. **2A** and **2B**) of the PC **2** according to the first embodiment, the operation of the scanner **4** according to the second embodiment is different in that the scanner **4** performs the processes in **S605** to **S620**, whereas the PC **2** according to the first embodiment executes the processes in **S105** to **135**. The operation of the scanner **4** in a case when the determination in

S165 indicates that the interrupt button **111a** is pressed (“Yes”) is the same as the operation of the PC **2** according to the first embodiment shown in FIG. **2B**. Therefore, the operation of the scanner when the determination in **S165** is “Yes” is understood from the operation of the above-described operation of the PC **2** shown in FIG. **2B**. Therefore, detailed explanations are omitted.

Next, the explanation of the processes of the scanner **4** in **S605** to **S620** is focused. First, as shown in FIG. **20**, the main controller **41a** of the scanner **4** causes the input display part **43** to display the initial screen **601** shown in FIG. **22**, for example (**S605**). More specifically, the main controller **41a** outputs a display request for the initial screen **601** to the display controller **41d**. When the display request is inputted from the main controller **41a**, the display controller **41d** reads out the image data from the memory part **42** for displaying the initial screen **601**, outputs the image data to the input display part **43** and causes the input display part **43** to display the initial screen **601**. The operation of the main controller **41a** and the display controller **41d** for displaying various screens on the input display part **43**. Therefore, the explanation is omitted below.

FIG. **22** is a diagram illustrating an example of a display screen of the data processing device according to the first embodiment and illustrates a configuration example of the initial screen **601**. The “initial screen **601**” is a dialog box for instructing to print (copy) an image of the document set on the scanner **4**. In the example shown in FIG. **22**, the initial screen **601** includes a start button **601a**, a numerical keypad, a plurality of print setting items (input areas) for inputting desired print settings including the copy count, and the like.

For instructing the printer to print (copy) the image of the document set on the scanner **4**, the user selects predetermined items in the respective print setting items by moving a cursor (black line part) displayed in the initial screen **601** and presses the start button **601a** after appropriately inputting the desired print settings by operating the numerical keypad. Here, the user inputs a desired copy count (e.g., “10”) in the copy count input area in the initial screen **601** and presses the star button **601a**.

When the user presses the start button **601a**, the main controller **41a** of the scanner **4** accepts the print settings inputted in the respective print setting items in the initial screen **601** (**S610**). At this time, the main controller **41a** saves in the memory part **42** the values of the print settings inputted in the respective print setting items in the initial screen **601** (especially, the copy count inputted in the “copy count” input area shown in FIG. **22**) as the print setting data. In the memory part **42**, print setting data, such as scanner name, IP address, port name and the like, is stored in advance. The print setting data that includes the copy count data is used for generating the print data, print interruption command, copy count change command and the like.

After **S610**, the main controller **41a** causes the image reading part **41b** to read the document and to obtain read image data (**S615**). More specifically, the main controller **41a** outputs a document reading request to the image reading part **41b**. When the document reading request is inputted from the main controller **41a**, the image reading part **41b** optically reads the document, obtains read image data and stores the obtained read image data in the memory part **42**.

When the read image data is obtained by the image reading part **41b**, the main controller **41a** causes the image data converter **41c** and the communication controller **41e** to execute a “print data generation and transmission” process and requests the printer to print (**S620**). The printer starts the print process by receiving the print data from the scanner **3** in **S305** shown

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in FIG. 6. Details of S620 are shown in FIG. 21. FIG. 21 is a flow diagram illustrating an operation of the data processing device according to the second embodiment at the time of generating and transmitting the print data.

As shown in FIG. 21, the main controller 41a first causes the image data converter 41c to generate print data (S620a). In particular, the main controller 41a outputs a print data generation request to the image data converter 41c. When the print data generation request is inputted from the main controller 41a, the image data converter 41c converts the read image data into image data in a printable format and associates a print command (copy command) with the image data to generate the print data. The "copy command" is a control command for instructing the printer 3 to print the read image of the document and is substantially the same as the print command.

When the print data is generated, the main controller 41a reads out the print setting data (e.g., copy count, scanner name, IP address, port name, etc.) from the memory part 42, sets "print (copy)" as a job type, and causes the image data converter 41c to associate the print setting data with the print data (S620b). More specifically, the main controller 41a outputs an association request of the print setting data with the print data to the image data converter 41c. When the association request of the print setting data with the print data is inputted from the main controller 41a, the image data converter 41c associates the print data association setting data shown in FIG. 27 with the print data. Here, the explanation is made with an assumption that the image data converter 41c associates the setting data 701 that sets the copy count to "10" with the print data. Hereinafter, the print data with which the setting data 701 has been associated is also simply referred to as "print data." For example, the image data converter 41c, which is the print data generator, generates several different page image data (in this example, page image data composed of ten different pages) from the document data as the image data used for the print process according to instructions of the main controller 41a. Further, according to instructions of the main controller 41a, the image data converter 41c adds setting data, which designate the copy count to be 10 copies, to the print data so that the image data converter 41c generates the print data of total 100 pages by which 10 copies for each of the ten pages are made.

FIG. 27 is a diagram illustrating a configuration of the setting data used in the second embodiment. FIG. 27 indicates, as the setting data 701, a job type, setting items, such as copy count, scanner name, IP address, port name and the like, and values corresponding to the respective setting items.

After S620b, the main controller causes the communication controller 41e to transmit the print data to the printer (S620c). At this time, the communication controller 41e transmits the print data from the communication part 46 to the printer 3 through the LAN 6. When the print data is received from the scanner, the printer 3 associates a job ID with the print data and notifies the scanner 4 of the job ID. After that, the process moves to S136 shown in FIG. 20.

The main controller 41a of the scanner 4 receives the job ID from the printer (S136). Then, the main controller 41a associates the job ID with the print setting data that includes the copy count data stored in the memory part 42 and stores the job ID in the memory part 42. The job ID stored in the memory part 42 is used for generation of setting data 702 and 703 (see FIGS. 28 and 29) that is associated with the print interruption command or the copy count change command when the print interruption command is transmitted to the printer 3 in S170 shown in FIG. 2B or when the copy count change command is transmitted to the printer 3 in S190

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shown in FIG. 2B. Here, the explanation is made with an assumption that an ID generated by the printer 3 is used as the job ID. However, the scanner 4 may generate the ID, and such ID may be used.

Thereafter, the scanner 4 operates in the same manner as the PC 2 according to the first embodiment. However, in the second embodiment, the image data converter 41c forms the print data generator and executes the process similar to that by the print data generation part 21b in the first embodiment.

Further, in the second embodiment, when the print interruption request is inputted from the main controller 21a in S170a shown in FIG. 4, the image data converter 41c associates the print interruption command association setting data 702 shown in FIG. 28, for example, with the print interruption command. FIG. 28 is a diagram illustrating a configuration of the setting data used in the second embodiment. FIG. 28 indicates, as the setting data 702, a job type, setting items, such as copy count, scanner name, IP address, port name and the like, and values corresponding to the respective setting items.

Further, in the second embodiment, when the copy count change request is inputted from the main controller 21a in S190a shown in FIG. 5, the image data converter 41c associates the copy count change command association setting data 703 shown in FIG. 29, for example, with the print interruption command.

FIG. 29 is a diagram illustrating a configuration of the setting data used in the second embodiment. FIG. 29 indicates, as the setting data 703, a job type, setting items, such as copy count, copy count, scanner name, IP address, port name and the like, and values corresponding to the respective setting items.

<Example of Display Screen of Data Processing Device>

Below, examples of display screen of the scanner 4 as the data processing device are explained with reference to FIGS. 22 to 26B. FIGS. 22 to 26B each illustrate an example of a display screen of the data processing device according to the second embodiment.

As described above, FIG. 22 illustrates a configuration example of an initial screen 601. The scanner displays the initial screen 601 on the input display part 43 in S605 shown in FIG. 20. When the user requests printing to the printer, the user inputs desired values in the respective input areas (e.g., input "10" in the "copy count" input area) in the initial screen 601 and presses the start button 601a. The initial screen 601 closes when the start button 601a is pressed. After that, a copy count change screen 611 (see FIG. 23) is displayed on the input display part 43.

As described above, FIG. 23 illustrates a configuration example of the copy count change screen 611. The scanner 4 displays the copy count change screen 611 on the input display part 43 in S140 shown in FIG. 20. When the user causes the printer to execute the print process as is without changing the copy count, the user presses the OK button 611b or the cancel button 611c. The copy count change screen 611 closes when the OK button 611b or the cancel button 611c is pressed. Moreover, when the user changes the copy count, the user inputs a desired value in the copy count input area 611d and presses the OK button 611b after pressing the interrupt button 611a to cause the printer 3 to interrupt the print process being executed. In this case, the copy count change screen 611 is closed at a predetermined timing, such as timing when the print completion notice is received from the printer in S145 shown in FIG. 20 or S205 shown in FIG. 2B.

The printer 3 interrupts the print process when the user presses the interrupt button 611a. Thereafter, when the user inputs a desired value in the copy count input area 611d and

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presses button **611d**, the printer **3** resumes (reprint) the print process. After that, one of notification screens **612**, **613**, **614** and **615** shown in FIGS. **24** to **26B** is displayed (preferably for predetermined time) on the input display part **43** depending on the value input in the copy count input area **611d** in the copy count change screen **611** or depending on a status of progress of the print process by the printer **3**. These notification screens **612**, **613**, **614** and **615** are overlaid on the copy count change screen **611** if the copy count change screen **611** is being displayed

FIGS. **24A** to **24C** each illustrate an example of a display screen when the user inputs a value (e.g., **1**), as the value of the copy count after change, that is less than the copy count before change, in the copy count input area **611d**. In this case, the main controller **31a** of the printer **3** determines “Yes” in **S370e** (determination process for “Copy count after change<Copy count before change?”) shown in FIG. **10B** and determines “Yes” in **S370f** (determination process for “Copy count after change≠0?”) shown in FIG. **10B**. Then, the main controller **31a** of the printer **3** determines whether or not there is unprocessed printing in **S370g** shown in FIG. **10B**.

If the determination in **S370g** indicates that there is unprocessed printing (“Yes”), the main controller **31a** of the printer **3** transmits to the scanner **4** message data as a setting change notification that indicates that the copy count has been changed and that the print process is to be resumed, in **S370m** shown in FIG. **10B**. As a result, the scanner **4** displays the notification screen **612** shown in FIG. **24B** on the input display part **43** in **S200** shown in FIG. **2B**.

On the other hand, if the determination in **S370g** indicates that there is no unprocessed printing (“No”), the main controller **31a** of the printer **3** transmits to the scanner **4** message data as the setting change notification that indicates that the designated copy count has been printed and that reprinting is to be cancelled, in **S370u** shown in FIG. **10D**. As a result, the scanner **4** displays the notification screen **613** shown in FIG. **24C** on the input display part **43** in **S200** shown in FIG. **2B**.

FIGS. **25A** and **25B** each illustrate an example of a display screen when the user inputs “0” as a value of the copy count after change in the copy count input area **611d**. In this case, the main controller **31a** of the printer **3** determines “Yes” in **S370e** (determination process for “Copy count after change<Copy count before change?”) shown in FIG. **10B** and determines “No” in **S370f** (determination process for “Copy count after change≠0?”) shown in FIG. **10B**. Then, the main controller **31a** of the printer **3** transmits to the scanner **4** message data as the setting change notification that indicates that the job cancellation has been executed, in **S370r** shown in FIG. **10C**. As a result, the scanner **4** displays the notification screen **614** shown in FIG. **25B** on the input display part **43** in **S200** shown in FIG. **2B**.

FIGS. **26A** to **26B** each illustrate an example of a display screen when the user inputs a value (e.g., **20**), as the value of the copy count after change, that is more than the copy count before change, in the copy count input area **611d**. In this case, the main controller **31a** of the printer **3** determines “No” in **S370e** (determination process for “Copy count after change<Copy count before change?”) shown in FIG. **10B**. Then, the main controller **31a** of the printer **3** transmits to the scanner **4** message data as the setting change notification that indicates that the copy count has been changed and that the print process is to be resumed, in **S370m** shown in FIG. **10B**. As a result, the scanner **4** displays the notification screen **615** shown in FIG. **26B** on the input display part **43** in **S200** shown in FIG. **2B**.

As described above, according to the second embodiment, in addition to the PC, the scanner also realizes the data pro-

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cessing device. As described above, according to the data processing device according to the first embodiment, when the user changes the copy count, the user can determine a preferable setting for each print setting item based on the settings displayed in the copy count change screen. Therefore, the user need not memorize the past print settings or manually input the print settings.

Accordingly, the user’s burden to change the copy count is reduced.

In addition, similar to the data processing device according to the first embodiment, the data processing device according to the second embodiment simplifies steps for finding the job ID to be cancelled and steps for selecting the job ID to be cancelled. As such, the user can designate the job ID to be cancelled at a short period of time. Therefore, the data processing device executes job cancellation at a high rate.

The present embodiments are not limited to those described above, and various changes and modifications are available without departing from the scope of the invention. For example, the image forming device is not limited to a printer but may be a multifunction printer (MFP) or a facsimile device that has a function to print by designation of the copy count.

What is claimed is:

1. A data processing device that transmits a control command and print data to an image forming device, comprising:
 - a communication part that executes communication with the image forming device;
 - an input part to which an instruction for the image forming device is inputted;
 - a display part that displays images;
 - a print data generator that generates the control command and the print data;
 - a communication controller that controls the communication by the communication part;
 - a memory part that stores data including the print data; and
 - a main controller that controls operation of the communication part, the input part, the display part, the print data generator, the communication controller and the memory part, wherein
 - when the main controller causes the print data generator to generate the print data and to associate setting data that includes copy count data that designates a copy count of the print data with the print data, and
 - when the main controller causes the communication controller to transmit the print data, with which the setting data is associated, to the image forming device,
 - the main controller causes the memory part to save the setting data at least until the main controller receives a notification, which indicates completion of a print process of the print data, from the image forming device, and
 - the main controller causes the display part to display a screen, as a copy count change screen for instructing a change in the copy count, that displays settings of the print data that is changeable by the input part, the settings of the print data including the copy count designated by the copy count data, wherein
 - when a print interruption command, which instructs interruption of the print process of the print data, and a copy count change command, which indicates the change in the copy count for the print data, are sequentially transmitted to the image forming device, and
 - when notifications, which indicate that the copy count has been changed and that the print process has resumed, are received, as a response to the copy count change command, from the image forming device,

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the main controller causes the display part to display a notification screen that indicates the change in the copy count and resuming of printing.

2. The data processing device according to claim 1, wherein

the copy count change screen displays selectably a plurality of operational keys that correspond to control commands for interrupting the print process and for changing the copy count.

3. The data processing device according to claim 1, wherein

when the print interruption command and the copy count change command are sequentially transmitted to the image forming device and

when a notification, which indicates that the printing has completed and that the print process has been cancelled, is received, as a response to the copy count change command, from the image forming device,

the main controller causes the display part to display a notification screen that indicates that the print data has been printed and that the printing has been cancelled.

4. The data processing device according to claim 1, wherein

when the print interruption command and the copy count change command are sequentially transmitted to the image forming device, and

when a notification, which indicates that the print process has been cancelled, is received, as a response to the copy count change command, from the image forming device, the main controller causes the display part to display the notification that indicates cancellation of print.

5. The data processing device according to claim 1, wherein

the data processing device is configured as a personal computer.

6. The data processing device according to claim 1, wherein

the data processing device is configured as a scanner.

7. The data processing device according to claim 1, wherein

the print data includes page images of multiple different pages, and

the copy count includes a numerical value to which a number of copies of each of the page images is equal.

8. An image forming device that forms an image based on print data generated by a data processing device, comprising:

a communication part that executes communication with the data processing device;

a memory part that stores control commands and the print data that includes setting data received from the data processing device;

a print part that executes a print process based on the print data;

a notification part that generates a notification to the data processing device and transmits the notification via the communication part; and

a main controller that controls operation of the communication part, the memory part, the print part and the notification part, wherein

when the print data is received, with which the setting data that includes copy count data designating a copy count is attached,

the main controller stores the print data in the memory part from the data processing device, and causes the print part to execute the print process for the copy count based on the print data, and

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when a print interruption command that instructs interruption of the print process of the print data and a copy count change command that instructs a change in the copy count for the print data are sequentially received from the data processing device,

after storing in the memory part history data that includes a printed copy count at time of interruption, the main controller specifies an unprocessed copy count based on the history data and the copy count change command, and causes the print part to execute the print process for the unprocessed copy count based on the print data.

9. The image forming device according to claim 8, further comprising:

an analysis part that analyzes the print data and the control commands received from the data processing device;

an edit and development part that generates printable image data by editing and developing the print data stored in the memory part; and

a print controller that causes the print part to print images based on the image data, wherein

when the print data is received from the data processing device,

the main controller causes the analysis part to analyze the print data and to obtain the copy count data, causes the edit and development part to generate the image data for the copy count designated by the copy count data, and causes the print part to execute the print process via the print controller based on the generated image data for the copy count.

10. The image forming device according to claim 9, wherein

when the print process for the print data is interrupted as the print interruption command and the copy count change command are sequentially received from the data processing device, and

when a copy count after change requested by the copy count change command is less than a copy count before change,

if the copy count after change is greater than the copy count for which the printing has completed,

the main controller resumes the print process, causes the print part to execute the print process for a remaining copy count, and causes the notification part to transmit notifications, which indicate that the copy count has been changed and that the print process has resumed, to the data processing device, and

if the copy count after change is equal to or less than the copy count for which the printing has completed,

the main controller ends the print process and causes the notification part to transmit notifications, which indicate that the print process has completed and that the print process has been cancelled, to the data processing device.

11. The image forming device according to claim 9, wherein

when the print process for the print data is interrupted after the print interruption command and the copy count change command are sequentially received from the data processing device, and

when the copy count after change is zero,

the main controller cancels the print process and causes the notification part to transmit a notification, which indicates that the print process has been canceled, to the data processing device.

12. The image forming device according to claim 9, wherein

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when the print process for the print data is interrupted as the print interruption command and the copy count change command are sequentially received from the data processing device, and

when the copy count after change is greater than the copy count before change, the main controller resumes the print process, and causes the notification part to transmit notifications, which indicate that the copy count has been changed and that the print process has been resumed, to the data processing device.

13. The image forming device according to claim 9, wherein

either when the print interruption command is continuously received from the data processing device, or when the print interruption command and the copy count change command that designates the copy count as zero are sequentially received from the data processing device,

the main controller cancels the print process and causes the notification part to transmit a notification, which indicates that the print process has been canceled, to the data processing device.

14. The image forming device according to claim 8, wherein

the print data includes page images of multiple different pages, and

the print part executes the print process for each of the page images as the same times as a number indicated by the copy count.

15. An image forming device that forms an image based on print data generated by a data processing device, comprising:

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a communication part that executes communication with the data processing device;

a memory part that stores control commands and the print data that includes setting data received from the data processing device;

a print part that executes a print process based on the print data;

a notification part that generates a notification to the data processing device and transmits the notification via the communication part; and

a main controller that controls operation of the communication part, the memory part, the print part and the notification part, wherein

when the print data is received, with which the setting data that includes copy count data designating a copy count is attached, the main controller stores the print data, received from the data processing device, in the memory part, and causes the print part to execute the print process for the copy count based on the print data, and

when a print interruption command that instructs interruption of the print process of the print data and a copy count change command that instructs a change in the copy count for the print data are received, the main controller specifies an unprocessed copy count based on history data and the copy count change command, and causes the print part to execute the print process for the unprocessed copy count based on the print data, and

the history data that includes a printed copy count at time of interruption is stored in the memory part.

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